assessed

The University Library
Leeds

STOR

The Library of the
School of Medicine

Presented by Messrs. Charles F.
Thackray, Ltd.

3 0106 01350 2462

Case No. 33

Armley Hospita
1906.

A

SHORT PRACTICE

OF

GYNÆCOLOGY

By the same Author

A SHORT PRACTICE OF MIDWIFERY

FOURTH EDITION

With 152 Illustrations and an Appendix containing the Statistics of the Rotunda Hospital for the past thirteen years.

Crown 8vo, 8s. 6*d*.

A SHORT
PRACTICE OF GYNÆCOLOGY

BY

HENRY JELLETT, B.A., M.D., B.Ch., B.A.O. (Dublin University), F.R.C.P.I., L.M.;

EX-ASSISTANT MASTER, ROTUNDA HOSPITAL; EXTERN EXAMINER IN MIDWIFERY AND GYNÆCOLOGY, ROYAL UNIVERSITY OF IRELAND; EXAMINER IN MIDWIFERY, ROYAL COLLEGE OF PHYSICIANS, IRELAND; LATE UNIVERSITY EXAMINER IN MIDWIFERY AND GYNÆCOLOGY, DUBLIN UNIVERSITY

SECOND EDITION, REVISED AND ENLARGED

WITH 223 ILLUSTRATIONS

LONDON
J. & A. CHURCHILL
7, GREAT MARLBOROUGH STREET
1903

UNIVERSITY OF LEEDS MEDICAL LIBRARY

12918

PREFACE TO THE FIRST EDITION.

THE following Short Practice of Gynæcology has been written with the object of affording a concise account of gynæcological diseases and of their treatment. Necessarily, in a book of this size it is impossible to describe all accepted theories, modes of treatment, and operations, and consequently the author has limited himself to those theories and practices which appear to him to rest on the surest base in the present state of gynæcological knowledge, and to be adopted by the most reliable authorities. In its essentials, the practice taught in this book is the practice of the Rotunda Hospital.

The author wishes to return his most sincere thanks to Dr. A. V. Macan, former Master of the Rotunda Hospital, for the kindness which he has shown in devoting a great amount of time to reading the proof sheets. The accuracy, and consequent value of the book, has been very much increased by the aid which he has given. The author also owes a large debt of gratitude to Dr. Carton, Assistant Master of the Rotunda Hospital, for the time and trouble he has devoted to the production of the illustrations, especially to the diagrams of operations.

The author also wishes to return his thanks to Dr. H. C. Drury and to Dr. F. Chetwode Crawley, for the trouble they have taken in reading over the proof sheets; to Mr. H. K. Lewis, for allowing him to reproduce various illustrations from Schultze's 'Uterine Displacements;' to Mr. Bland-Sutton and Dr. A. E. Giles, for similar permission with regard to illustrations from their 'Diseases of Women,' 'Surgical Diseases of the Ovaries and of the Fallopian Tubes,' and 'The Vaginal Radical Operation;' and to Messrs. Appleton and Co., for the use of an illustration from Kelly's 'Operative Gynæcology.' He must also thank Messrs. Fannin and Co. for their kindness in providing all the excellent blocks of instruments which have been used.

HENRY JELLETT.

61, Lower Mount Street,
Merrion Square, Dublin;
June, 1900.

PREFACE TO THE SECOND EDITION.

The present edition of A Short Practice of Gynæcology has been enlarged by the addition of a considerable number of new illustrations and by additions to the text. In consequence, it has been deemed well to publish the book in a slightly altered form. It has been the author's endeavour to make its teaching as modern and as complete as possible and to omit unnecessary and irrelevant details, and he trusts that the results of his work will be found to be a book of practical value.

Thanks to the liberality of his publishers, the author has been able to very much improve the illustrations, and he owes a special debt of gratitude to Mr. J. T. Murray for the manner in which he has discharged the difficult task of providing diagrams of the various gynæcological operations. He also is much indebted to Sir Arthur Macan and Dr. W. J. Smyly for most kindly allowing him to obtain photographs of operations at their clinics. If the former edition of this book has been received with approval, it is because it was based on the teachings of these distinguished authorities, to whose instruction in the past and kindly criticism any merit which it possesses is due.

The author also desires to thank Dr. C. Hubert Roberts for his kindness in allowing him to reproduce many of the beautiful original drawings from his work on Gynæcological Pathology; M. Masson and The New Sydenham Society for allowing him to reproduce several illustrations from Pozzi's work on Gynæcology; and Messrs. Appleton and Co. for similar permission in the case of some illustrations from the works of Kelly and Cullen. He is also indebted to Professor E. H. Bennett, Professor A. C. O'Sullivan, and Dr. Earl, who have kindly lent him pathological specimens from which drawings have been made; to Dr. Arthur Ball for photographs of operations and pathological conditions; and to Dr. Drury and Dr. Ball for most kindly reading the proof sheets.

HENRY JELLETT.

61, Lower Mount Street,
Merrion Square, Dublin;
October, 1903.

CONTENTS.

PAGE

CHAPTER I.

THE DIAGNOSIS OF GYNÆCOLOGICAL CASES.

The History of the Patient—Physical Examination: Pelvic Examination, Bimanual Examination, Combined Rectal and Vaginal Examination: Abdominal Examination—Diagnostic Instruments: the Speculum, Tenaculum, Sound, Curette, Cervical Dilators, Microscope—Diagnostic Operations—Importance of Early Diagnosis 1

CHAPTER II.

MENSTRUATION AND ITS DISORDERS.

Menstruation: Theories concerning—Amenorrhœa: Apparent, Actual—Menorrhagia and Metrorrhagia—Dysmenorrhœa: Membranous Dysmenorrhœa 16

CHAPTER III.

DISEASES OF THE BLADDER AND URETHRA.

The Bladder: Cystitis; Ætiology, Symptoms, Treatment—The Urethra: Vascular Caruncle; Varieties, Symptoms, Treatment—Prolapse of the Urethral Mucous Membrane; Symptoms, Treatment 25

CHAPTER IV.

DISEASES OF THE VULVA AND PERINÆUM.

The Vulva. Vulvitis—Catarrhal Vulvitis; Pathological Anatomy, Ætiology, Symptoms, Treatment—Exudative Vulvitis—Phlegmonous Vulvitis—Herpes—Eczema—Pruritus Vulvæ—Elephantiasis: Treatment—Kraurosis Vulvæ; Symptoms, Treatment—Tumours: Benign Neoplasms; Malignant Neoplasms, Carcinoma, Sarcoma—Hæmatoma—Retention Cysts—Herniæ—Hydrocele of the Canal of Nuck—Tuberculosis of the Vulva. The Perinæum—Traumatisms of 30

PAGE

CHAPTER V.

DISEASES OF THE VAGINA.

Vaginitis. Catarrhal Vaginitis; Pathological Anatomy, Ætiology, Symptoms, Treatment, Complications—Exudative Vaginitis: Symptoms, Treatment—Phlegmonous Vaginitis; Symptoms, Treatment—Emphysematous Vaginitis—Vaginismus; Ætiology, Symptoms, Treatment—Tumours; Benign Neoplasms—Malignant Neoplasms; Carcinoma, Sarcoma—Vaginal Cysts—Hæmatoma, Tuberculosis of the Vagina . 42

CHAPTER VI.

DISEASES OF THE UTERUS.

Errors of Development. Congenital Absence of Uterus—Double or Bipartite Uterus, Treatment—Stenosis of the Cervical Canal, Symptoms, Treatment—Congenital Atrophy of the Uterus—Infantile Uterus—Congenital Atresia of the Cervix—Congenital Hypertrophy of the Cervix; Treatment 54

CHAPTER VII.

DISEASES OF THE UTERUS (*continued*).

Displacements of the Uterus. Definitions of Terms—Normal Positions of the Uterus—Table of Displacements—Upward Displacements; Ætiology, Symptoms, Treatment—Downward Displacements; Ætiology, Pathological Anatomy, Symptoms, Treatment—Backward Displacements; Retroversion and Flexion, Ætiology, Symptoms, Diagnosis, Treatment. Retroposition—Forward Displacements; Anteversion and Flexion; Ætiology, Symptoms, Treatment; Anteposition—Lateral Displacements of the Uterus: Dextro- or Sinistro-version or Flexion, Ætiology, Treatment — Torsion — Inversion: Degrees; Varieties; Acute Inversion; Ætiology, Symptoms, Diagnosis, Treatment, Prognosis; Chronic Inversion, Ætiology, Symptoms, Diagnosis, Treatment 58

CHAPTER VIII.

DISEASES OF THE UTERUS (*continued*).

Traumatic Lesions of the Uterus. Inflammatory Diseases of the Uterus—Corporeal Metritis: Acute; Ætiology, Pathology, Symptoms, Complications, Treatment: Chronic; Myometritis, Ætiology, Pathology, Symptoms, Treatment; Endometritis, Varieties, Ætiology, Pathology, Symptoms, Treatment—Cervical Metritis: Acute; Ætiology, Pathology, Symptoms, Complications, Treatment; Chronic, Ætiology, Pathology, Symptoms, Treatment 104

CHAPTER IX.

DISEASES OF THE UTERUS (*continued*).

New Growths of the Uterus—Myomata; Ætiology, Pathological Anatomy, Secondary Changes, Symptoms, Diagnosis, Prognosis, Treatment—

PAGE

Malignant Neoplasms: Carcinoma of the Body; Pathological Anatomy, Symptoms, Diagnosis, Prognosis, Treatment: Carcinoma of the Cervix; Pathological Anatomy, Symptoms, Prognosis, Treatment: Sarcoma; Varieties, Pathological Anatomy, Symptoms, Diagnosis, Prognosis, Treatment: Deciduoma Malignum; Ætiology, Pathological Anatomy, Symptoms, Diagnosis, Treatment—Tuberculosis of the Uterus; Varieties, Diagnosis, Treatment 124

CHAPTER X.

DISEASES OF THE FALLOPIAN TUBES.

Inflammatory Diseases of the Tubes. Salpingo-oöphoritis; Ætiology—Pathological Anatomy: Salpingitis — Acute Salpingitis — Chronic Salpingitis: Varieties—Hæmatosalpinx: Oöphoritis—Acute Oöphoritis—Chronic Oöphoritis — Symptoms — Diagnosis — Prognosis — Treatment, Palliative, Radical. New Growths of the Tubes: Benign Neoplasms—Malignant Neoplasms. Tuberculosis of the Tubes—Pathological Anatomy—Treatment. Tubal Pregnancy 157

CHAPTER XI.

DISEASES OF THE OVARIES.

Displacements of the Ovaries—Undescended Ovary—Hernia of the Ovary—Ascent of the Ovary—Descent of the Ovary—Varieties, Ætiology, Symptoms, Diagnosis, Treatment. Inflammatory Diseases of the Ovary. New Growths of the Ovary: Cystic Tumours of the Ovary—Varieties, Ætiology, Symptoms, Diagnosis, Prognosis, Treatment. Solid Tumours—Fibroma—Sarcoma—Carcinoma, Symptoms, Treatment. Tuberculosis of the Ovary 177

CHAPTER XII.

DISEASES OF THE PELVIC PERITONEUM AND THE UTERINE LIGAMENTS.

Pelvic Peritonitis: Pathological Anatomy, Symptoms, Prognosis, Treatment—Pelvic Cellulitis—Pathological Anatomy, Symptoms, Treatment. Diagnosis, Prognosis. Tumours of the Broad Ligament—Cysts: Pathological Anatomy, Treatment—Fibroma—Hæmatoma—Tumours of the Round Ligament—Cysts—Fibroma 196

CHAPTER XIII.

TRAUMATIC DISEASES OF THE GENITAL ORGANS.

Traumata which favour Prolapse—Symptoms—Diagnosis—Treatment—Traumata which cause Fistulæ—Varieties—Ætiology, Symptoms—Diagnosis—Treatment 205

CHAPTER XIV.

GENITAL ATRESIÆ.

Genital Atresia: Varieties — Symptoms — Diagnosis — Prognosis—Treatment 216

PAGE

CHAPTER XV.

INTERNAL HÆMORRHAGE OF GENITAL ORIGIN.

Intra-peritoneal Hæmorrhage—Ætiology—Symptoms—Diagnosis—Prognosis — Treatment. Extra-peritoneal Hæmorrhage — Symptoms—Diagnosis—Treatment 220

CHAPTER XVI.

GYNÆCOLOGICAL OPERATIONS.

Definitions—Sterile—Aseptic—Antiseptic—Surgical Cleanliness—Sterilization. Preparation of the Operating Room—Dressings—Sponges—Instruments—Suture Materials—Preparation of Patient—Operator's Hands—Antiseptics—Operating Table and Gynæcological Couch . 227

CHAPTER XVII.

CŒLIOTOMY.

Definition—Ventral Cœliotomy—Indications — Instruments — Operation: Drainage; Closure of the Abdominal Wound; Kelly's Method—Operative Complications — After-treatment; Rest, Diet, Bladder, Intestinal Tract, Dressing of Wound—Post-operative Complications—Vaginal Cœliotomy—Relative Advantages of Vaginal and Abdominal Cœliotomy—Indications, Instruments, Operations; Anterior Colpotomy, Mackenrodt's Operation, Dührssen's Operation; Posterior Colpotomy 235

CHAPTER XVIII.

OPERATIONS ON THE URETHRA AND BLADDER.

Removal of an Urethral Caruncle—Indications—Instruments—Operation—After-treatment. Excision of Prolapsed Urethra—Indications—Instruments—Operation—After-treatment. Operations for the Cure of Vesico-vaginal Fistula — Instruments — Operations; Marion Sims', Sänger's, Rutherford Morison's, Dudley's, Mackenrodt's, Trendelenburg's—After-treatment. Vesico-cervical and uterine Fistulæ. Urethral and Ureteral Fistulæ. Artificial Vesico-vaginal Fistula—Indications — Instruments—Operations—After-treatment. Cystoscopy—Indications—Instruments—Operation—After-treatment . . . 262

CHAPTER XIX.

OPERATIONS ON THE VULVA, PERINÆUM, AND VAGINA.

Operations on the Vulva: Amputation of the Clitoris—Indications—Instruments—Operation—After-treatment: Removal of Bartholin's Gland—Indications—Instruments—Operation: Solid Tumours of the Labium: Imperforate Hymen—Operation. Operations on the Perinæum and Vagina: Perinæorrhaphy and Colpo-perinæorrhaphy—Indications—Instruments — Operations; Incomplete Perinæorrhaphy and Colpo-

PAGE

perinæorrhaphy, Lawson Tait's, Kelly's, Martin's, Hegar's—Complete Perinæorrhaphy and Colpo-perinæorrhaphy, Lawson Tait's, Hegar's—Complications—After-treatment—Operations—Complications—After-treatment: Anterior Colporrhaphy — Indications — Instruments—Operation — Complications — After-treatment: Colpocleisis — Indications—Operation: Removal of Vaginal Cysts: Atresia of the Vagina—Operation 279

CHAPTER XX.

MINOR OPERATIONS ON THE UTERUS.

Amputation of the Cervix: Supra-vaginal Amputation—Indications—Instruments—Operation — Complications — After-treatment. Amputation of the Vaginal Portion—Indications—Instruments—Operations—After-treatment. Trachelorrhaphy—Indications—Instruments—Operations; Sänger's, Emmet's—After-treatment. Division of the Cervix — Indications — Instruments — Operations; Bilateral Division, Posterior Division—After-treatment. Dilatation of the Cervix—Indications—Instruments—Operations; Gradual Dilatation; Rapid Dilatation — After-treatment. Curetting — Indications — Instruments — Operation—After-treatment—Complications. Atmocausis and Zestocausis—Indications—Operation. Removal of Submucous Myomata —Indications—Instruments—Operation—After-treatment—Complications. Curetting and Cauterisation of Irremovable Malignant Disease — Indications — Instruments — Operation — Complications — After-treatment. Reposition of Adherent Retro-deviated Uterus—Indications—Instruments—Operation—Complications 308

CHAPTER XXI.

MAJOR OPERATIONS ON THE UTERUS.

Hysterectomy: Ventral Hysterectomy—Indications—Instruments—Operations: Partial Hysterectomy; Schroeder's Operation, Kelly's Operation: Total Hysterectomy; Doyen's Operation, Werder's Operation—Complications—After-treatment. Vaginal Hysterectomy—Indications —Instruments—Operations: Without Mutilation of Uterus; Suture Operation, Clamp Operation: With Mutilation of Uterus; by Median Incision, by Morcellation — Complications — After-treatment. Myomectomy and Enucleation — Indications — Instruments — Operation; Myomectomy, Enucleation—After-treatment. Hysteropexy—Indications — Instruments — Operations; Ventral; Vaginal, Mackenrodt's Operation, Dührssen's Operation—After-treatment. Radical Cure of Inversion—Indications—Instruments—Operation—After-treatment . 338

CHAPTER XXII.

OPERATIONS ON THE TUBES AND OVARIES.

Salpingectomy—Indications—Instruments—Operation—After-treatment. Salpingostomy—Indications—Instruments—Operation. Ovariotomy —Indications—Instruments—Operation—Complications—After-treatment. Oöphorectomy, Salpingo-oöphorectomy—Indications—Instruments—Operation. Resection of the Ovary and Ignipuncture—Indications—Instruments—Operation 381

PAGE

CHAPTER XXIII.

OPERATIONS ON THE UTERINE LIGAMENTS AND PELVIC PERITONEUM.

Shortening of the Round Ligaments—Indications—Instruments—Operations; Extra-peritoneal Shortening, Intra-peritoneal Shortening—Complications—After-treatment. Vaginal Incision and Drainage—Indications—Instruments—Operation—After-treatment—Complications. Radical Treatment of Peritoneal Adhesions—Instruments—Operation—After-treatment 392

A SHORT

PRACTICE OF GYNÆCOLOGY.

CHAPTER I.

THE DIAGNOSIS OF GYNÆCOLOGICAL CASES.

The History of the Patient—Physical Examination: Pelvic Examination, Bimanual Examination, Combined Rectal and Vaginal Examination: Abdominal Examination—Diagnostic Instruments: Speculum, Tenaculum, Sound, Curette, Cervical Dilators, Microscope—Diagnostic Operations—Importance of Early Diagnosis.

A DIAGNOSIS is arrived at in gynæcological cases by first ascertaining the history of the patient, and by then making a careful and complete physical examination. The relative value of the respective information obtained in these two ways differs in different cases. The history of the patient is always of importance, inasmuch as it tells us of what she is complaining, that is what her subjective symptoms are, but it is seldom that an accurate diagnosis can be made from it. Gynæcological conditions, differing widely in pathology and in clinical importance, tend to cause symptoms that are identical in general character, and that differ only to a small extent in degree, and which consequently will not form a sound basis for accurate diagnosis. The physical examination, on the other hand, if thoroughly and systematically carried out, is of extreme importance, and enables the cause of the particular group of symptoms complained of to be discovered.

1. THE HISTORY OF THE PATIENT.—In eliciting the history of the

patient, the following are the principal points on which information must be obtained:—

(1) *Her Age.*—The life of a woman can be divided into certain periods which have an important bearing on her symptoms and physical condition, and on gynæcological treatment. Accordingly, it is of importance to ascertain her age in order to know through which of these periods she is passing. These periods are as follows:—

(*a*) Infancy and childhood. This period lasts from birth to puberty, and during it the sexual organs are dormant, so that, so far as they are concerned, the child is asexual.

(*b*) Puberty. Puberty is the term applied to the commencement of the sexual life of the woman. The age at which it occurs differs considerably in different countries, and is affected by climate, mode of life, and race. As a general rule, it occurs earlier in hot countries, and later in cold countries; earlier in girls who live in a city or in affluent circumstances, later in those who live in the country or in poor circumstances; earlier in the Latin races than in the Anglo-Saxon. In these countries, puberty usually occurs between the ages of thirteen and sixteen. Its onset is characterised by the rapid development of the breasts and genital organs, the appearance of menstruation, changes in the outline of the figure due to the increased deposit of fat, and alterations in the habits and inclinations.

(*c*) Nubility. Nubility is the term applied to the period of sexual activity during which childbirth occurs. It lasts from puberty to the menopause. The first few years of this period are characterised by the development of the sexual organs, the last year or two by gradual retrograde changes which take place in them, and the intervening years by their full activity.

(*d*) Menopause. The menopause is the term applied to the period of cessation of menstruation and sexual activity. The exact time at which it occurs varies in different women within considerable limits. According to Leith Napier, it as a rule comes on between forty-five and fifty, while the average is forty-seven, *i. e.* thirty-three years after puberty. It is characterised by the cessation of menstruation, by the gradual loss of the sexual appetite, and, in some women, by slight nervous disturbances.

(*e*) Post-climacteric period. This is the concluding period of a woman's life, and extends from the menopause to death. It is characterised by the atrophy of the genital organs.

(2) *Is she single, married, or a widow?*—If married, for how long? If a widow, for how long was she married, and for how long is she a widow? The state of life of a woman is important as showing that she is, or is not, exposed to some of the causes of genital disease. For a similar reason, if she is married, it must be ascertained whether she lives with her husband, and if she does not, how long an interval has elapsed since last doing so.

(3) *Number and Nature of Pregnancies.*—In addition to ascertaining the number of pregnancies, information must be obtained regarding their nature and the nature of the respective labours. With this object, the following points must be ascertained:—

(*a*) Duration of pregnancies, *i. e.* number of abortions, immature or premature births, and full-term labours.

(*b*) Nature of labours, *i.e.*, normal, prolonged, or instrumental; nature of complications, if any.

(*c*) Nature of puerperium, *i.e.*, a rapid convalescence and a complete recovery, or a protracted convalescence; if the latter, the cause of protraction.

(*d*) Time since birth of last child. If pregnant at present, for how long?

(4) *Menstrual History.*—The menstrual history is the most important part of the information afforded by the patient. Information on the following points must be elicited:—

(*a*) The age at which menstruation commenced.

(*b*) The usual interval between the periods, and the occurrence of any variations in it. The usual interval is about twenty-four days from the end of one period to the commencement of the next.

(*c*) Amount of discharge, whether normal, excessive (menorrhagia), scanty, or absent (amennorrhœa). It is often difficult to determine with any exactness what a woman means by saying that the discharge is natural, excessive, or slight in amount. Every woman is more or less a rule to herself, and usually when she says that the loss at a period was natural, excessive, or slight in amount, she means that the amount was the same as, was greater, or was less, than it habitually is. Some more definite idea of the amount of the discharge may be obtained by inquiring into the number of napkins used daily during the period, and the extent to which each was soiled. The average amount is from four to six ounces.

(*d*) The usual duration of the period. The duration of the period varies considerably in different women, even in a condition of perfect health. The usual duration is from four to five days.

(*e*) The occurrence of pain. A varying degree of discomfort or even actual pain occurs in a considerable proportion of women who otherwise appear to menstruate normally and are apparently in perfect health. Pain, however, must be regarded as pathological when it is sufficient to interfere with the avocations of the woman or with her general health.

(*f*) The passage of clots. Normal menstrual discharge should not contain clots. Their presence is always pathological.

(*g*) The occurrence of a discharge of blood between the periods. This should never occur in health; it is a symptom of many of the graver forms of uterine disease, and is known as metrorrhagia.

(*h*) The date of last menstruation. This is of considerable importance, as it points to, or excludes, the probability of pregnancy.

(5) *The Presence of Vaginal Discharge.*—The presence of a white or yellow vaginal discharge (leucorrhœa) is a symptom common to many forms of vaginal and uterine disease. It usually is mucoid or muco-purulent in character, and in some cases is watery or contains blood.

(6) *The Existence of Pain.*—The occurrence of pain must be ascertained, and also its site, degree of intensity, whether continuous or intermittent, and, if the latter, the time and frequency of onset.

(7) *The General Health.*—In addition to determining the presence of special symptoms—the result of genital disease, the presence of any symptoms suggestive of disease of the cardiac, respiratory, digestive, and urinary systems must also be ascertained.

II. The Physical Examination.—The information obtained from the physical examination of the patient is even more important than that obtained from her history. The latter tells the symptoms the patient requires to be cured of, and in most cases furnishes at least a clue to the nature of the case; but for the exact diagnosis of the condition of affairs present the physical examination has to be almost entirely relied upon. The physical examination naturally falls under two heads:—

(1) Abdominal examination.
(2) Pelvic examination.

(1) *Abdominal Examination.*—If we exclude the examination of organs other than pelvic, abdominal examination is only of use in gynæcological cases when the abdomen is occupied by a tumour which has risen above the pelvic brim, or when the abdomen is distended by fluid. In such cases we can obtain by its means, first, a diagnosis between a tumour and ascites, and secondly, if (1) the presence of a tumour is determined, some information with regard to its size, consistency, outline, and connections with the (2) other abdominal contents. The pelvic connections of the tumour—and in the large majority of cases this implies the differential diagnosis of the case—can only be determined by means of a "bimanual," or abdomino-vaginal, examination. Abdominal examination is of special assistance in distinguishing between (3) large uterine or ovarian tumours and a pregnant uterus, an enlarged kidney or spleen, or other tumour of the abdominal as opposed to the pelvic viscera.

(2) *Pelvic Examination.*—In order to carry out a thoroughly satisfactory pelvic examination, the patient must be by preference in the dorsal position on a suitable gynæcological couch, and the abdominal walls must be relaxed. If it is impossible to procure sufficient relaxation without an anæsthetic, the latter must be administered. In all cases the bladder must be empty, and also, if possible, the intestines. The most suitable gynæcological couch is undoubtedly the "Veit-Schroeder," or some modification of it (*v.* Fig. 1). If, however, such a couch is not at hand, a satisfac-

tory pelvic examination can be made by making the patient lie on her back on a low couch or bed with her thorax raised and her knees drawn up, so as to obtain the maximum relaxation of the abdominal wall.

Vaginal examination alone is not of such importance in gynæcological work as in obstetrical. By its means the condition of the perinæum, the vagina, and of the cervix can be determined, but beyond this little information is obtainable.

The mode of examination on which we almost entirely rely for pelvic information is the "bimanual method." This is carried out as follows:—Place the patient in the lithotomy position on a gynæcological couch, and stand between the knees with the right foot upon the stool of the couch. Having ascertained that the bladder is empty, introduce the index finger of the right hand into the vagina, keeping it pressed against the perinæum, and (1) pass it upwards into the anterior fornix. At the same time the elbow must rest upon the right knee, in order that the weight of the arm may be supported. The fingers of the left hand are then laid flat upon the abdominal wall in the middle line, the tips reaching halfway up to the umbilicus. The tips of the fingers are pressed backwards in the direction of the promontory of the sacrum, in such a manner that the fingers roof over, as it were, the pelvic cavity. Now, by endeavouring to approximate these with the finger in the vagina, we are enabled to determine that something lies between the two (*v.* Fig. 2). By gently

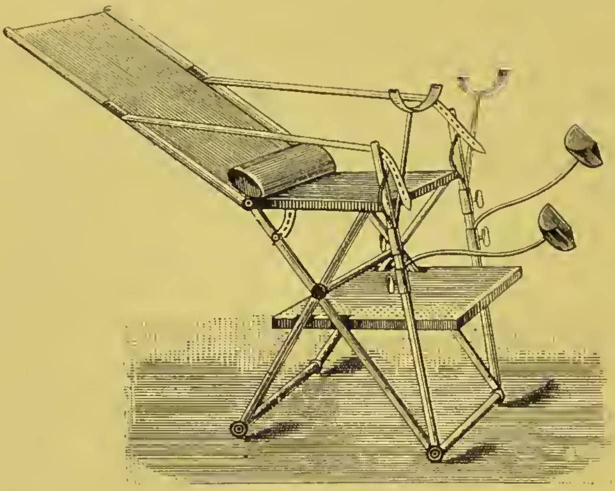


FIG. 1.—Veit-Schroeder gynæcological couch.

rotating the external fingers, we are able to map out the outlines of the intervening object, and to determine in a normal case that it is the uterus. If the finger in the vagina is not of sufficient length, by inserting the middle finger also we are enabled to reach some half an inch higher. If the fingers are approximated

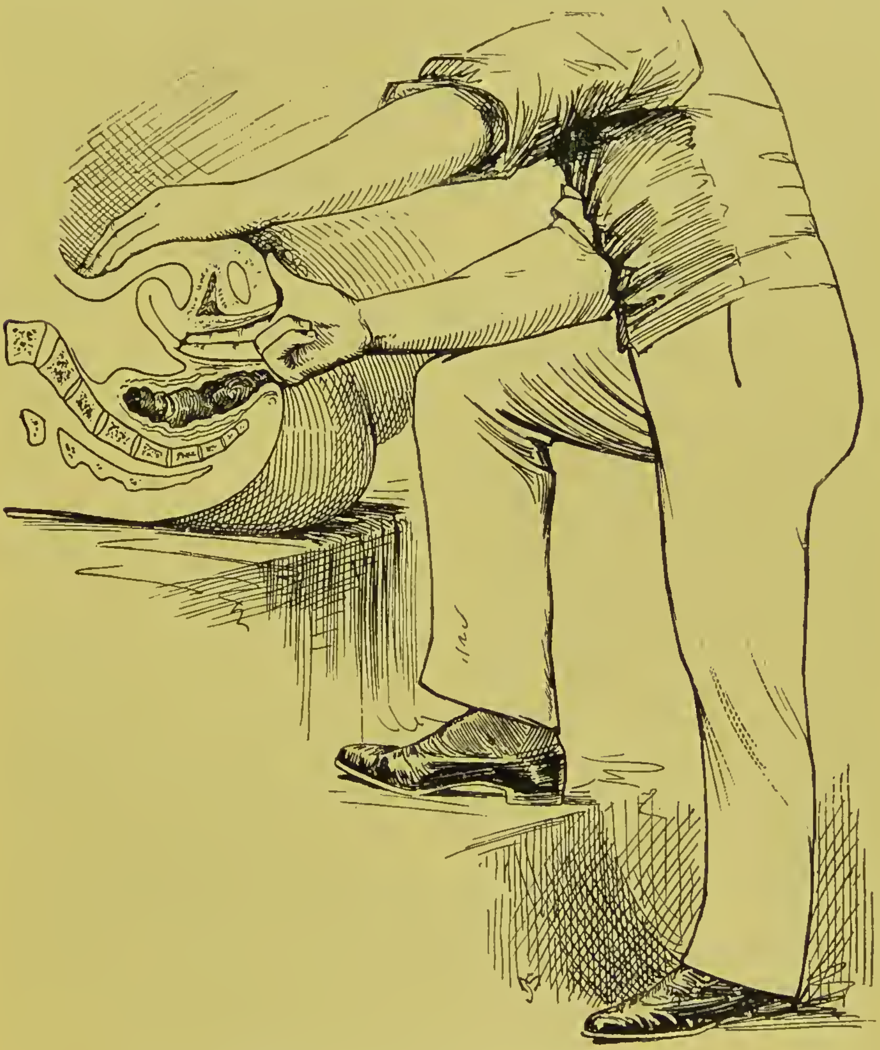


FIG. 2.—Method of making a bimanual examination.

without finding anything between them, the vaginal fingers are (2) withdrawn from the anterior fornix and placed directly under the cervix. Then, by pushing the cervix upwards in the direction of the external fingers, the entire uterus, if it is in front, is lifted up towards the abdominal wall, and is more easily felt. If the uterus is lying posteriorly, the cervix, and its junction with the body, alone are felt. Next, the vaginal fingers are passed into the posterior fornix, and, using the external fingers as before, the contents of Douglas' pouch are examined. In order to (4) palpate the ovaries, the vaginal fingers are placed in one or other

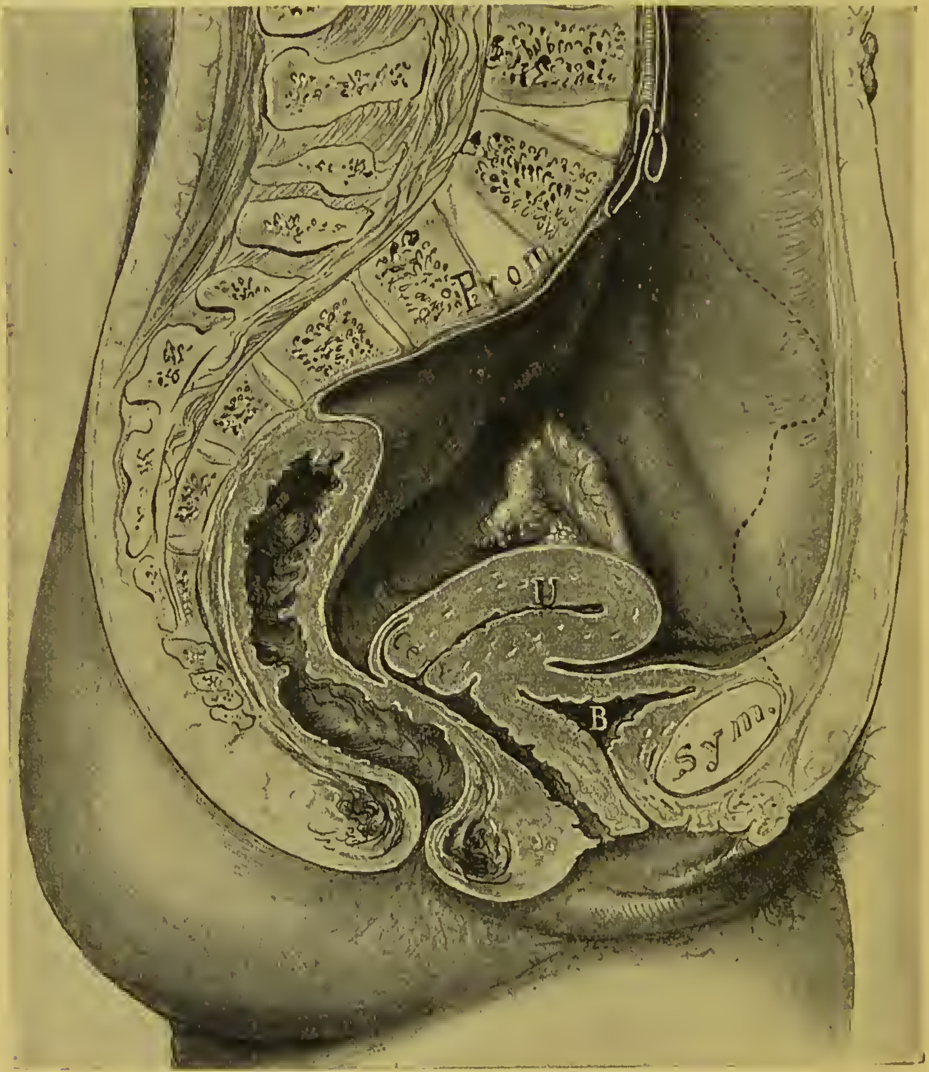


Fig. 3.—Sagittal section through adult body, showing the normal position and relations of the uterus, bladder, rectum, and abdominal walls. The intestines are not shown, and the dotted line represents the outline of the pelvic bones. Note the proximity of the anterior abdominal wall to the sacral promontory. (*Kelly.*)

lateral fornix, and approximated to the external fingers. If the ovaries are not at once felt between them, both hands are drawn slowly and gently downwards towards the anterior wall of the pelvis and parallel with the conjugate diameter of the brim. The ovary of the same side will then be felt to slip between the fingers. The opposite ovary can be felt by examining at the opposite side in a similar manner. If the ovaries are not felt at

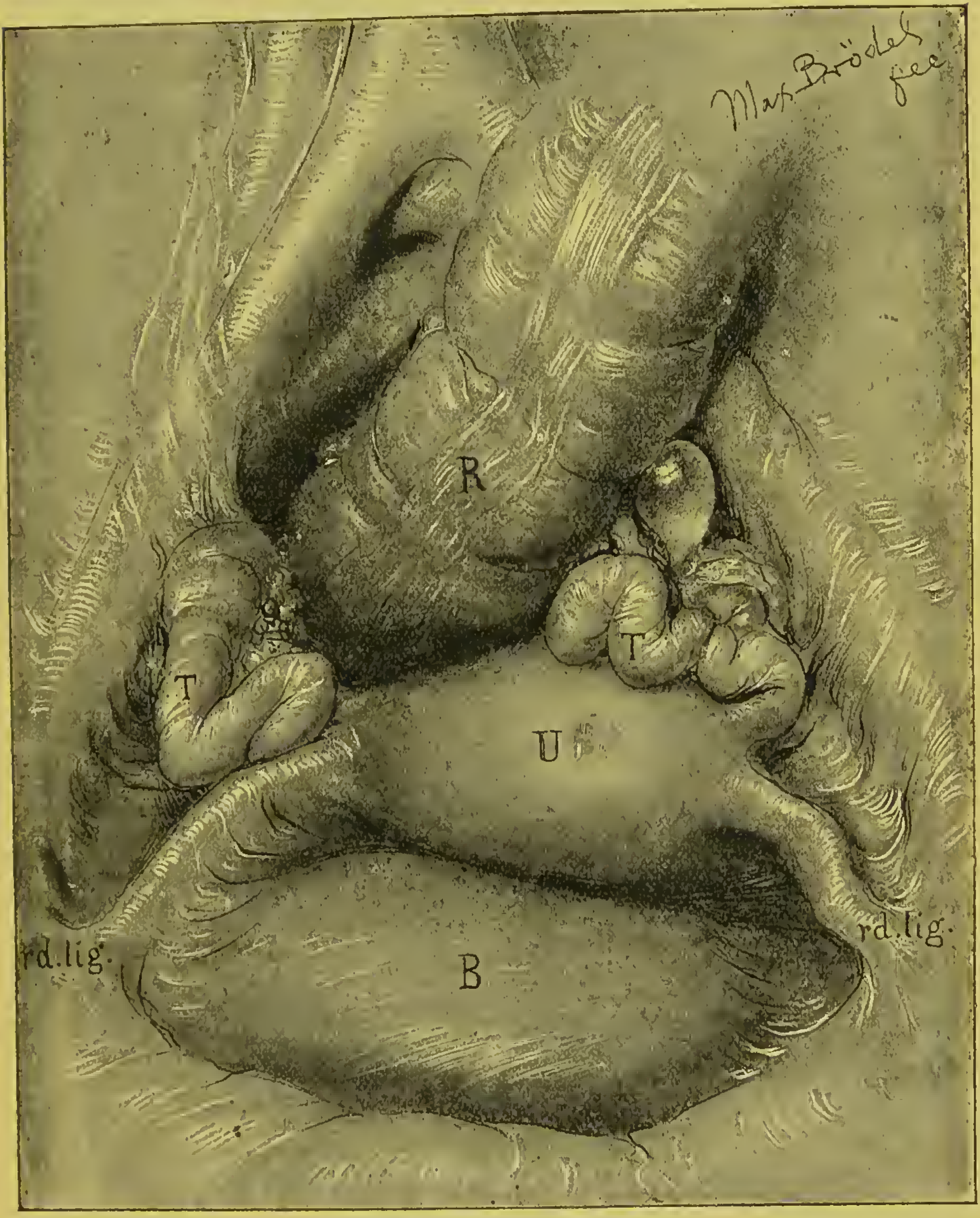


Fig. 4.—The relations of the pelvic viscera as seen from above. (*Kelly.*)

first, the fingers should be again drawn down as before, but keeping closer to the pelvic brim or to the uterus, so as to travel over fresh ground. It is usually considered best to examine the right adnexa with the fingers of the right hand in the vagina, and the left adnexa with the fingers of the opposite hand. The great essentials necessary to make a successful bimanual examination are to induce the patient to relax the abdominal muscles or to obtain relaxation by anæsthesia, to see that the bladder and intestines are empty, and to make all necessary movements with extreme gentleness, avoiding as far as possible unnecessary movements of the vaginal fingers.

A modification of this method of examination, which often enables us to obtain more information, is to make the examination as an abdomino-vagino-rectal examination instead of as an abdomino-vaginal examination. This is carried out in the same manner as the previous method, with the exception that the middle finger of the right hand is passed into the rectum, the index finger being kept in the vagina. In this way it is possible to tell not only what lies between the roof of the vagina and the abdominal wall, but also at the same time what lies between the vagina and the rectum.

It must not be forgotten that, in addition to the abdominal and pelvic examination, a thorough physical examination must be made in all cases with a view to determining the condition of the cardiac, respiratory, urinary, and digestive organs.

The latero-prone position, also known as Marion Sims' position, as it was he who first described it, is still used by many gynæcologists, both for the purpose of making a pelvic examination, and for performing certain vaginal operations. For the benefit of those who desire to follow in the steps of their predecessors, we shall describe the method of making a pelvic examination by Marion Sims' method; but, although we fully recognise the very great advance which it constituted over existing methods at the time at which it was introduced, we cannot recommend practitioners to adopt it or students to learn how to perform it at the present day. It is a method of considerable academic interest, but of little or no practical importance.

In order to examine a patient in this manner, a special speculum is required—Marion Sims' duck-billed speculum, and the patient is placed in a special position, the latero-prone or Marion Sims position. The description of the examination, as given by Marion Sims himself, is as follows:—"For a speculum examination, the patient is to lie on the left side. The thighs are to be flexed at about right angles with the pelvis, the right being drawn up a little more than the left. The left arm is thrown behind across the back, and the chest rotated forwards, bringing the sternum very nearly in contact with the table, while the spine is fully extended, with the head resting on the left parietal bone. The head must not be flexed on the sternum, nor the right shoulder elevated. Indeed, the position must simulate that on the knees as much as possible, and for this reason the patient is rolled over on the front, making it a left lateral semi-prone position. The nurse or assistant standing at her back pulls up the right side of the nates with the left hand, when the surgeon introduces the speculum, elevates the perinæum, and gives the instrument into the right hand of the assistant, who holds it firmly in the desired position." The speculum is introduced under the guidance of the right index finger, and care is taken that it does not catch against the cervix. "If the patient then breathes easily, the vagina will be immediately distended by the pressure of the atmosphere, so as to bring the neck of the uterus, the posterior *cul-de-sac,* and the whole of the anterior wall of the vagina into view, without the least traction, pressure, or suffering."

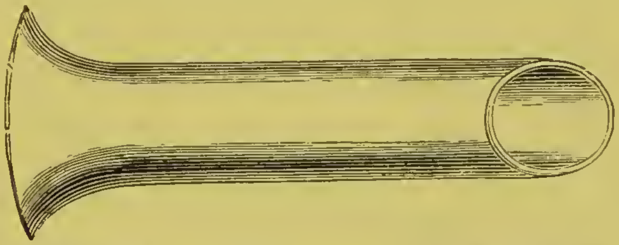


FIG. 5.—Cylindrical speculum made in metal after Fergusson's model.

If the chief object of a pelvic examination was to inspect the vaginal mucous membrane and the vaginal portion of the cervix, Marion Sims' position would be invaluable. As, however, we now recognise that the most important lesions in gynæcological diseases lie beyond the vagina, its value as a diagnostic aid is small. We shall, subsequently, refer to its use for operative purposes (*v.* page 234).

Diagnostic Instruments.—Amongst the most important instruments which are used for diagnostic purposes are the following :—

Speculum.—A suitable speculum is necessary in order to ascertain the condition of the vaginal or cervical mucous membrane.

The most serviceable form for this purpose is Fergusson's cylindrical speculum or some modification of it (*v.* Fig. 5). It must be made of metal or of porcelain, to enable it to be sterilised by boiling. Another form, which is sometimes more easily used as it is self-retaining, is Nott's trivalve speculum (*v.* Fig. 6). This is composed of three blades, which approximately form arcs of the same circle. It is inserted with the three blades in apposition with one another, and when in position these are made to diverge eccentrically by means of a screw.

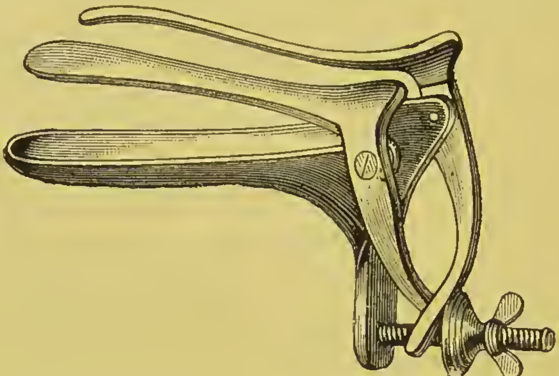


Fig. 6.—Nott's trivalve speculum, almost ½ scale.

Volsellum.—The most generally used form of volsellum is that known as an American bullet forceps (*v.* Fig. 7). Such an instrument is required for fixing the cervix or drawing it down into view, and for this purpose an American forceps is admirably suited.

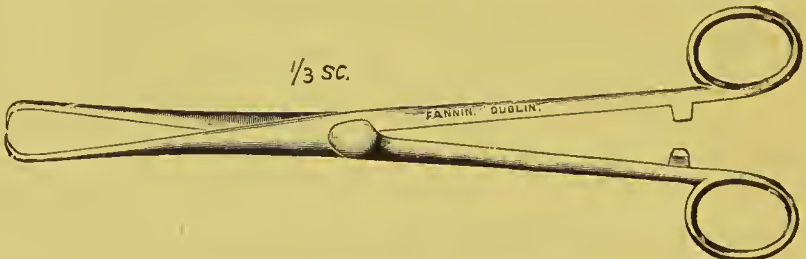


Fig. 7.—American bullet forceps.

Sound.—A uterine sound is of use for ascertaining the position of the uterus when it is impossible to do so by a bimanual examination. It is also used for ascertaining the length and size of the uterine cavity, the presence of abnormal formation of the uterus—as double uterus or the like, and the existence and outline of intra-uterine tumours. The sound, like many other things, has fallen into a certain amount of disrepute owing to its too frequent and too incautious use in the past. When it is introduced through a septic vagina into the uterine cavity it is undoubtedly a dangerous instrument. It must be remembered that, if it is to be used with safety, the vagina must first be thoroughly douched and disinfected, or else the sound must be passed through the latter in such a manner that it does not come in contact with the mucous membrane. NB

Curette.—A curette (*v.* Figs. 180—183) is a serviceable instrument for ascertaining the nature of obscure conditions of the uterine mucous membrane, inasmuch as it enables us to bring away a small portion of the latter, which can then be examined under the microscope. By its timely use in cases of uterine hæmorrhage, malignant diseases can be recognised in their early stage, and thus the most favourable chance given for operative interference.

Cervical Dilators.—Cervical dilators of some form are necessary in almost all cases in which it is considered advisable to pass the finger into the uterus in order to ascertain the nature of its contents. They may be divided into two classes—those which act
1. gradually, and those which act rapidly. 2.

In the first class, come the so-called tents and hydrostatic dilators. (1) A tent is the name applied to cylindrical rods of different sizes made from various absorbent substances, which tend to increase in size as they imbibe moisture. The commonest, and the safest to use, as they can be most easily sterilised, are those made from sea-tangle (*Laminaria digitata*). These are kept in absolute alcohol and corrosive sublimate (1 per cent. solution), and before use are immersed, for a second, in water. They are then passed into the cervix, taking care that they traverse the internal os. The number used depends upon their size and upon the initial capacity of the cervical canal. It is better to use a number of small tents than one or two large ones, and as a rule as many are inserted as the cervix will hold without any forcing. Tupelo-wood tents are also sometimes used as a substitute for laminaria. They can be obtained of a larger size than can the latter, and are said to expand more uniformly. They are sterilised in corrosive and alcohol as described. Tents are also made of sponge, but they are inadmissible on account of the difficulty of sterilising them. Tents produce their maximum amount of dilatation within twelve to twenty-four hours. If a further amount of dilatation is required, the first set of tents is removed and an increased number inserted (*v.* page 322). Hydrostatic dilators—of which Barnes' bag is a type—are very rarely used in gynæcological practice. A third method of gradual dilatation, but one which is very much slower than the foregoing, is the introduction of a succession of firm tamponades of iodoform gauze into the uterine cavity. Each tamponade is left in from twenty-four to forty-eight hours, and the process usually requires to be repeated some six or eight times in order to obtain sufficient dilatation. During this process, it is not necessary to confine the patient to bed, as is the case when tents are used, and this in itself is sometimes of advantage.

2 In the second class of cervical dilators are included Hegar's dilators and their various modifications. Hegar's dilators are made of vulcanite or metal, and in twenty-six sizes (*v.* Fig. 8). They are graduated from No. 1, which is about the size of a coarse knitting-needle, up to No. 26, and the numbers correspond to their diameter in millimetres. In order to introduce them, the cervix is seized in a bullet forceps, and then, after ascertaining the direction of the cervical canal by means of a sound, the largest dilator, which the cervix will admit, is passed. This is followed after a few seconds' interval by the next in size, and so on until the required degree of dilatation is obtained. These dilators furnish the most satisfactory means of obtaining the degree of dilatation necessary for curetting, *i. e.* about up to No. 10; after this, however, they tend to tear the cervix unless it is unusually dilatable (*v.* page 322).

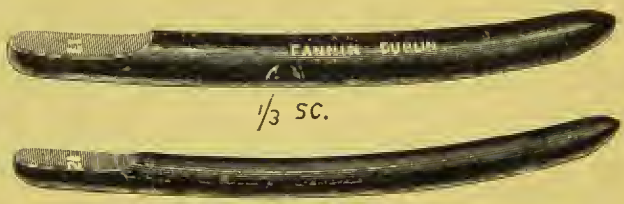


Fig. 8.—Hegar's dilators.

The Microscope.—It is of course impossible to deal here with the use of the microscope for diagnostic purposes. It is only necessary to call attention to the great value of microscopical examination in diagnosing malignant disease in its early stages, and tubercular disease at almost any stage.

Diagnostic Operations.—In some cases of obscure intra-peritoneal disease, the only method of effecting a diagnosis is by means of a cœliotomy. Such a cœliotomy may be performed through the abdominal wall or through the vagina. As a general rule we should follow the latter route, if we have reason to believe that by so doing we can obtain the information we require, as the danger of a vaginal cœliotomy is less than that of an abdominal one (*v.* page 247).

The digital or instrumental exploration of the uterine cavity, the removal of the endometrium, or of a portion of some cervical or vaginal tumour for microscopical examination, and the digital or ocular examination of the bladder, must also be included under this heading as minor diagnostic operations.

Before leaving the subject of diagnosis the author would like to insist on the necessity of making an accurate diagnosis of all cases of uterine hæmorrhage, and of abdominal tumours, at the earliest possible moment. Nothing has contributed to the comparative failure of the operative treatment of malignant disease in the past so much as the neglect of this precaution.

CHAPTER II.

MENSTRUATION AND ITS DISORDERS.

Menstruation: Theories concerning—Amenorrhœa: Apparent, Actual—Menorrhagia and Metrorrhagia—Dysmenorrhœa: Membranous Dysmenorrhœa.

There are many objections to the customary plan followed in gynæcological handbooks of devoting a chapter to the disorders of menstruation. These disorders are purely symptomatic, and when described in a separate chapter to students, the latter are only too likely to consider them as definite diseases, and to be quite satisfied with making a diagnosis of "menorrhagia," or "amenorrhœa," or "metrorrhagia," as the case may be, without paying any attention to the preceding causes of the condition. At the same time, it is very difficult to convey a knowledge of these disorders without making a definite attempt to classify their causes and varieties. On the whole, it is probably better to include such a chapter, limiting it, however, as far as possible to a statement of the varieties and causes of these disorders, and discussing the treatment in another place.

Before considering the disorders of menstruation, it is necessary to have some knowledge of the physiology of this process.

MENSTRUATION.

Menstruation (*menstrualis*, monthly) is the term applied to the periodical escape of the menstrual fluid, which escape takes place physiologically every fourth week from puberty to the menopause, except during pregnancy and lactation. In these countries, puberty, as a rule, occurs between the ages of thirteen and sixteen. In hot countries, on the other hand, it comes on at an earlier date, and in cold countries at a later. The menopause usually comes on about thirty-three years after puberty, that is some time between forty-five and fifty. The menstrual fluid consists of venous blood—which is prevented from clotting owing to its mixture with the acid vaginal discharge, and of fragments of endometrium which are undergoing fatty degeneration. It varies in amount from four to six ounces, and its discharge lasts normally from four to five days. In the amount

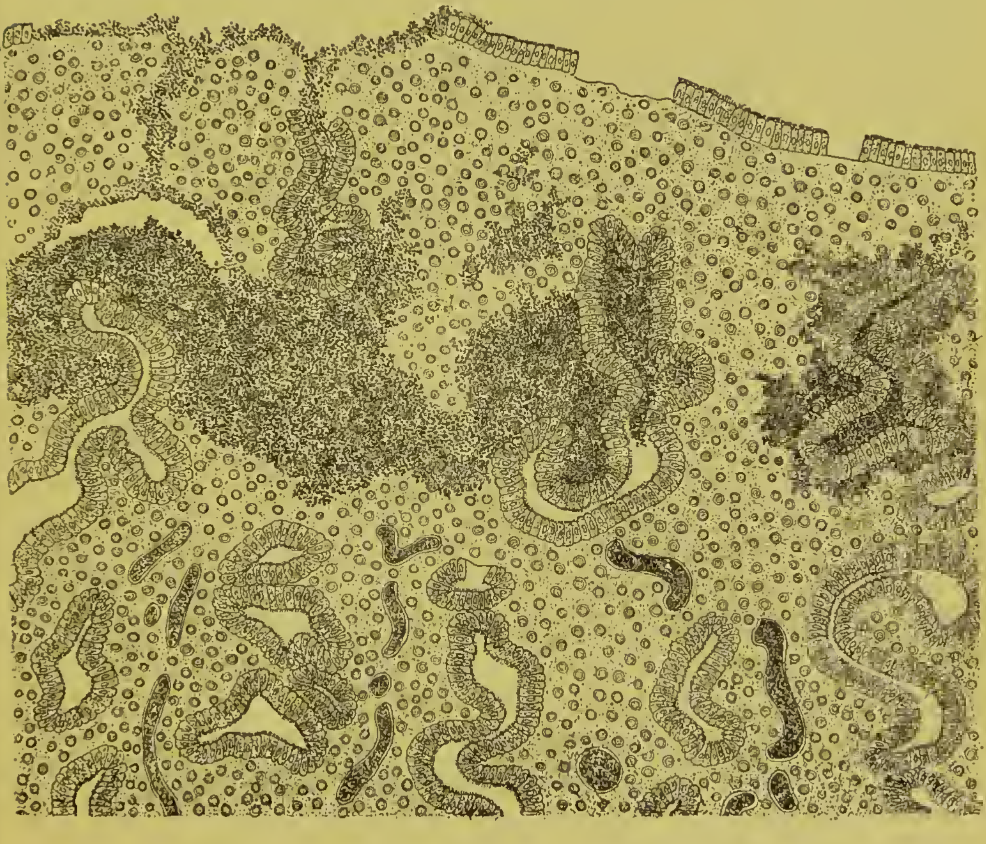


Fig. 9.—Section of the mucous membrane of the uterus during normal menstruation. (*Wyder.*)

of the discharge, the attendant symptoms, the duration of the period, and the interval between the periods, every woman is a law to herself.

It would be impossible to give an account of all the different theories which have been advanced with regard to the causes of the changes that take place during or in association with menstruation, and with regard to the cause of the process itself. In the following description Bland-Sutton's teaching is followed.

The principal changes, which take place during or in association with menstruation, are to be found in the ovaries, and in the uterus. I In the ovaries, the process known as ovulation—that is, the ripening and escape of an ovum from the ovary—takes place. Most usually the ovum, after it has escaped from the ovary, falls into the Fallopian tube and is carried along it into the uterus. If the ovum is fertilised, it develops into an embryo; if it is not, it is perhaps carried off in the menstrual discharge. The exact relationship in point of time between ovulation and menstruation is not very clear, but, in all probability, the ovum enters the uterine cavity either just prior to, or during, menstruation.

II In the uterus, the following changes take place during menstruation:—"The mucosa of the non-menstruating uterus is composed of a stroma containing numerous glands and blood-vessels, and covered by a single layer of cubical epithelium. Shortly before menstruation begins, the stroma cells proliferate and the superficial vessels become dilated; with increased congestion, the dilated capillaries break down and blood is extravasated into the superficial parts of the stroma under the epithelium. Later, the epithelium gives way, probably in part from a degenerative change, and is cast off along with portions of the stroma and of the glandular epithelium. The *dèbris* passes out with the menstrual fluid. After a time, regeneration of the mucosal surfaces takes place by the reproduction of epithelium partly from the torn edges of the glands and partly by the transformation of stroma elements" (Bland-Sutton) (*v.* Fig. 9).

The proliferation of the stroma of the endometrium, which takes place prior to each menstrual period, may be regarded as a periodical attempt to prepare a suitable nidus for the possible advent of an impregnated ovum. If there is no such ovum to make use of the uterus thus prepared for its reception, the hypertrophied mucous membrane is thrown off during menstruation, regenerates itself, and again hypertrophies prior to the next period.

The explanation of the regular four-weekly recurrence of menstruation will be best found by considering menstruation as a cyclical process, exactly as is respiration or the action of the heart. The respiratory cycle lasts for four seconds, the cardiac cycle a little less than one second, while the generative cycle lasts for four weeks.

AMENORRHŒA.

Amenorrhœa (ἀ, negative; μήν, a month; ῥέω, I flow) is the term applied to the non-appearance or disappearance of the menstrual discharge during the normal "menstrual life" of a woman. This disappearance may occur as a physiological or as a pathological process. It is a physiological process when it occurs as the result of pregnancy or lactation; it is a pathological process when it results from disease either local or general.

Pathological amenorrhœa, with which we are alone concerned, may be divided into two classes:—

(A) Apparent amenorrhœa.
(B) Actual amenorrhœa.

(A) **Apparent Amenorrhœa.**—By apparent amenorrhœa, or cryptomenorrhœa (κρυπτός, hidden; μήν; ῥέω), is meant that there is no external appearance of menstrual discharge, although the ordinary menstrual changes are taking place inside the uterus in the usual manner. Such a condition is the result of an obstruction, congenital or acquired, to the outflow of the menstrual fluid. Obstruction is most usually caused by an imperforate hymen; more rarely it arises as the result of congenital occlusion of the vagina or cervix, or from acquired obstruction of these passages due to their cicatricial obliteration (*v.* page 216).

(B) **Actual Amenorrhœa.**—By actual amenorrhœa is meant that there is a complete cessation, either temporary or permanent, of the physiological escape of blood from the uterine blood-vessels. It must, however, be borne in mind that the occurrence of actual amenorrhœa does not by any means imply that ovulation is not going on in its normal manner. In some cases this latter process is completely suppressed, if it had ever started; in other cases it continues, although there may be no external manifestation associated with it in the form of menstrual discharge.

As menstruation is dependent on the healthy condition of three of the great systems of the body, it follows that any interference with the functions of these systems may bring about amenorrhœa. These three systems are:—

Thre

(1) The generative system.
(2) The circulatory system.
(3) The nervous system.

(1) *The Generative System.*—Amenorrhœa occurring as the result of pathological conditions of the generative system may be due to:—

(*a*) Congenital absence of uterus or ovaries.
(*b*) Removal of uterus or ovaries by operation.
(*c*) Atrophy or complete destruction of ovaries or endometrium by inflammatory disease, by new growths, or after parturition (hyperinvolution).

(2) *The Circulatory System.*—All diseases or conditions in which the amount of blood is lessened or altered in quality tend to produce amenorrhœa. The chief of these are anæmia, chlorosis, leucocythæmia, and all conditions which give rise to profuse or frequently repeated hæmorrhages. All debilitating conditions will come into this list also. They probably produce amenorrhœa either by interfering with the quality or quantity of the blood owing to the accompanying diminished nutrition, or, by weakening the action of the heart and lowering the blood-pressure, they render the capillary vessels of the uterus less likely to rupture in the ordinary manner. Amongst such conditions must be mentioned tuberculosis, malignant disease, the final stages of cardiac and renal disease, debilitating fevers during the period of pyrexia and of convalescence, and various toxic conditions, as in chronic poisoning by lead, mercury, morphia, and alcohol (Labadie-Lagrave).

(3) *The Nervous System.*—Exophthalmic goitre, general paralysis, and other forms of nervous disease frequently produce amenorrhœa. So-called "reflex amenorrhœa" is said to be caused by sudden chills, iced drinks, or cold baths, just before the appearance of the flow. Such conditions may give rise to a very temporary amenorrhœa lasting for one period; it is difficult to understand how they could produce a more permanent effect. Finally, the condition known as "sympathetic amenorrhœa" (Labadie-Lagrave), *i. e.* amenorrhœa occurring in patients who are very anxious to believe themselves to be pregnant, or who are persuaded that they have reached the menopause—autosuggestion (Pozzi), is also nervous in origin.

MENORRHAGIA AND METRORRHAGIA.

Menorrhagia (μήν; ῥήγνυμι, I burst forth) is the term applied to excessive menstrual discharge. Metrorrhagia (μήτρα, the womb; ῥήγνυμι) is the term applied to hæmorrhage occurring between the normal periods of menstruation. It is most frequently found in association with menorrhagia. As in the case of amenorrhœa, the causes of menorrhagia and metrorrhagia may be divided into those arising in:—

(1) The genital system.
(2) The circulatory system.
(3) The nervous system.

(1) *The Genital System.*—All the causes of menorrhagia or metrorrhagia, arising as a result of disease of the genital system, may be traced to the one factor—congestion. And any condition which predisposes to, or causes, congestion will, *ipso facto*, favour the occurrence of menorrhagia. The commonest of these factors is endometritis, while tumours of the uterus or ovaries, inflammatory conditions of the same organs, displacements, placental or decidual remains lying in the uterus, extra-uterine pregnancy, and sub-involution must also be included.

(2) *The Circulatory System.*—All conditions which tend to raise the blood-pressure must be considered as causes of menorrhagia. Amongst these come the earlier stages of heart and renal disease, hepatic cirrhosis, tumours which compress the portal vein or inferior vena cava, emphysema of the lungs, bronchiectasis, and fevers.

(3) *The Nervous System.*—As certain conditions are seen to cause "reflex amenorrhœa," so certain conditions may cause "reflex menorrhagia." The chief of these are too frequent coitus, falls—especially on the breech, too frequent use of hot baths, severe mental emotions, and occasionally perhaps mental disease (Labadie-Lagrave).

DYSMENORRHŒA.

Dysmenorrhœa (δύς, with difficulty; μήν; ῥέω) is the term applied to painful menstruation. In some women, menstruation is always attended by a certain amount of pain, or perhaps it would be better to say by a certain amount of discomfort, and in them the condition cannot be called dysmenorrhœa. The term must rather be confined to those cases in which menstruation is accompanied by pain sufficiently marked, either owing to its unaccustomed occurrence or to its degree, to be attended by nervous or constitutional disturbance.

gestive The causes of dysmenorrhœa are as follows:—

hanical (1) Undeveloped conditions of the uterus or ovaries.
(2) Inflammatory lesions of the uterus, ovaries, or tubes.
(3) Displacements of the uterus which involve the presence of a sharp bend in the lower portion of the utero-cervical canal.
(4) Tumours of the uterus, ovaries, or tubes.
(5) Congenital or acquired stenosis of the cervical canal.
(6) Certain more or less obscure nervous conditions—so-
lative Dysm called neuralgic dysmenorrhœa.

It will be seen that the majority of these causes act by producing congestion of the uterus or appendages. Such congestion causes an excessive increase of vascular tension during menstruation, and so produces increased pressure upon the terminal nerve filaments (Fritsch). In those cases in which dysmenorrhœa is not due to congestion, a mechanical cause can generally be found for its occurrence. This mechanical cause takes the form of an obstruction to ovulation, or to the escape of (a) the menstrual fluid. An obstruction to ovulation may be brought X about by peri-oöphoritis, in which condition the thickening of the capsule of the ovary prevents the rupture of the Graafian (b) follicle. An obstruction to the escape of the menstrual fluid may be caused by stenosis or atresia of the cervical canal, by tumours or congested endometrium blocking the os internum, and by acute flexions of the uterus.

As MacNaughton Jones has pointed out, the relation between congestive and obstructive dysmenorrhœa is very close. Congestion of the uterus during menstruation leads to obstruction, and obstruction in its turn leads to congestion. In consequence, it is extremely difficult to say definitely in any case whether congestion or obstruction is the primary cause of the dysmenorrhœa, and, as a rule, if our treatment is to be successful, both factors must be treated.

The existence of such a condition as obstructive dysmenorrhœa is vigorously denied by many authorities, on the ground that no case of true obstruction has ever been shown to exist, and many other theories have been brought forward to account for the origin of the pain. The usual alternative explanation offered is that the pain is due to the occurrence of spasmodic contraction of the uterus, which, instead of contracting as in health, slowly and gradually, to expel the menstrual discharge, contracts spasmodically, that is violently, suddenly, and painfully. That such contractions occur is doubtless true, but there must be some definite cause for their occurrence. Herman, who is opposed to the obstruction theory, suggests that in "spasmodic dysmenorrhœa the want of physiological relaxation of the cervix prevents normal, regular, and painless contraction of the body." We confess that we do not consider that this explanation is as satisfactory as one which attributes the cause of the spasmodic contraction of the uterus to an effort to overcome an obstruction caused in the manner we have described. It is somewhat significant that the rule in these cases of dysmenorrhœa is to find an exaggeration of the normal flexion of the uterus or a cervical canal which is narrower than normal, and it is equally significant that even those, who oppose the obstructive theory on theoretical grounds, resort, in practice, to measures whose result is to remove such obstruction. The dispute which has raged round the true cause of the dysmenorrhœa in these cases has become one of words more than of anything else, and might with profit be abandoned.

The

In some extremely rare cases the entire mucous membrane of the uterus becomes detached at each menstrual period, and is expelled, causing during the latter process great dysmenorrhœa. To this condition the term *membranous, or exfoliative, dysmenorrhœa* has been given. The ætiology of this condition is somewhat obscure. Undoubtedly, many cases, in which casts of the uterus have been expelled, were in reality cases of abortion ? or of extra-uterine pregnancy, but also well-authenticated cases of true membranous dysmenorrhœa have occurred, in which there was no possibility of the condition being due to either of these causes. Emmet attributed such cases to an altered condition of nutrition of the mucous membrane, which, instead of undergoing fatty degeneration prior to the menstrual period, becomes hypertrophied. As a result, when menstruation occurs, the blood, instead of forcing its way through the endometrium, collects below it, and so detaches it in a single piece. De Sinéty, who considered that the menstrual blood comes from the superficial group of capillaries of the endometrium under normal circumstances, believes that in these cases the hæmorrhage comes from the submucous capillaries, and that its escape thence being impeded, it causes a detachment of the mucous membrane. Siredey brings forward another theory, that owing to certain causes unduly strong contractions of the uterus occur, as a result of which the entire mucous membrane is thrown off in the same manner that the placenta is detached after delivery. Such a process is, however, scarcely possible unless previous hypertrophy of the endometrium had occurred.

CHAPTER III.

DISEASES OF THE BLADDER AND URETHRA.

The Bladder: Cystitis; Ætiology, Symptoms, Treatment—The Urethra: Vascular Caruncle; Varieties, Symptoms, Treatment—Prolapse of the Urethral Mucous Membrane; Symptoms, Treatment.

THE BLADDER.

Cystitis.—Cystitis (κύστις, the bladder) is the term applied to inflammation of the mucous membrane of the bladder.

Ætiology.—Cystitis may arise in any of the following ways:—

(1) By infection carried upwards through the urethra. This is very much the most common mode of infection. In cases of pre-existing vaginitis or urethritis, bacteria may be carried into the bladder on catheters or other instruments, or they may make their own way in by gradual extension of the inflammation upwards. Also, even when there are no bacteria in the urethra, they can be carried into the bladder by means of dirty instruments.

(2) By infection travelling downwards from the kidneys or ureters. In this case the bacteria may come from an already infected kidney or ureter, or they may be eliminated from the blood by a healthy, or comparatively healthy, kidney.

(3) By infection extending directly from a neighbouring septic area. This extension can occur if the bladder wall becomes involved in the inflammatory changes which take place in the tissues surrounding a septic area, or if an abscess formed in some neighbouring structure bursts into the bladder.

(4) By infection reaching the bladder through the blood.

It must be remembered that the mere presence of bacteria in the bladder is not sufficient to bring about cystitis; there must, in all probability, be some predisposing cause which enables the bacteria to attack the bladder wall. The exact nature of these causes cannot be regarded as fully ascertained, but two of the chief of them are probably to be found in any condition which prevents the complete emptying of the bladder, and in lesions of the epithelium lining the cavity.

The bacteria which are most commonly met with in cystitis are the gonococcus, streptococcus, staphylococcus, *Bacillus coli communis,* and tubercle bacillus.

Symptoms.—In the acute stage, the most prominent symptom is intense irritability of the bladder, as shown by scalding pain, constant inclination to pass water, and extreme tenderness of the bladder and the surrounding parts. There is also some elevation of temperature and general constitutional disturbance. The urine is passed in extremely small quantities, and is very turbid. It contains a varying amount of pus, and consequently much albumen, and in very acute cases there may be a little blood. On microscopical examination, there are found quantities of dead leucocytes, squamous epithelium, a few red blood-corpuscles, and bacteria. As the acute stage passes off, the irritability of the bladder becomes less, and the temperature and constitutional disturbances disappear. If the chronic stage lasts for a long period, the bladder walls become thickened, a point which can be determined by bimanual examination. In tuberculous cystitis it is usually possible to discover the tubercle bacillus, if several examinations are made of the sediment obtained by centrifuging the urine.

Treatment.—In the acute stage, local interference with the bladder should be avoided, as it probably only increases the congestion. The patient must be kept in bed, and our efforts directed to relieving the pain as far as possible. With this object, hot fomentations may be applied over the abdomen, and copious vaginal douches may be administered. At the same time, morphia may have to be injected hypodermically, if the pain is very severe. Hyoscyamus combined with benzoate of soda—the latter acting as a urinary acidulant – and infusion of buchu, are also of value. Urotropin in doses of from five to fifteen grains administered three times a day is a valuable urinary antiseptic, and is specially useful in cases of cystitis due to the *Bacillus coli communis.*

Sodu Benzoat
Tinct. Hyoscyami ʒ ss
Infus. Buchu ad ℥i

℞ Pot Bicarb. gr XV
Tr. Hyoscy. ʒ ss
Inf Buchu ad ℥i
tid

℞ Urotropin gr X
tds

As soon as the acute stage has passed off, as shown by the diminished frequency of micturition, the bladder may be washed out every second or third day. For this purpose the following solutions are used :—Saturated solution of boracic acid; creolin solution, at first of a strength of two drachms to the gallon, and gradually increased to double that strength; boro-glyceride (Barff's) about half an ounce to the pint. In cases in which the infection is probably gonorrhœal in origin, very weak formalin ½-2 solution is useful. Commence with a quarter to a half per cent. solution, and increase the strength gradually up to two per cent. as the patient will bear it. We have found protargol—a silver salt containing eight per cent. of silver, of great value in the treatment of cases of cystitis of septic origin. It is used at a strength of from one-half to two per cent.* in aqueous solution, and may be allowed to remain in the bladder for from five to ten minutes or even longer. It causes no pain or discomfort.

Irrigation of the bladder is most easily carried out in the following manner. Pour the solution to be used, at a temperature of about 95° F., into an ordinary jug—from which it can be drawn off by means of a syphon douche, or into a regular glass or metal douche can. After washing up the external parts, a medium-sized Bozemann's catheter is fixed on to the end of the

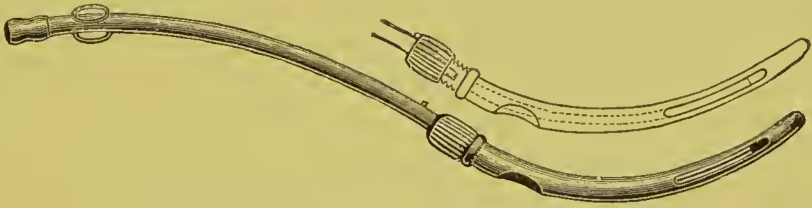


FIG. 10.—Bozemann's return catheter.

---

* As it takes some little time to make protargol solution in the correct proportions, it is useful to have a stock solution of it, from which weaker solutions of the required strength can be made. This may be done as follows :—Ten grammes (154 grs.) of protargol are placed in a small mortar and 5 c.cs. (81 minims) of neutral glycerine added, the two being stirred together with a glass rod until a perfectly homogeneous paste is produced. This paste is then diluted with 95 c.cs. (25½ drms.) of cold sterilised water, and shaken up until complete solution is effected. It is then stored in a coloured bottle in a dark place. As required, a quarter per cent. solution is made by adding 2·5 c.cs. (40 minims) of the standardised solution to 97·5 c.cs. (26 drms.), a half per cent. solution by adding 5 c.cs. (81 minims) to 95 c.cs. (25½ drms.), a one per cent. solution by adding 10 c.cs. (162 minims) to 90 c.cs. of water, and a two per cent. solution by adding 20 c.cs. to 80 c.cs. of water.

℞ Balsami Copaibae ♏ xx
Mucilaginis ʒ i
Liq Potassae ♏ x
Spt aether nit ʒ ss
Tinct Cubebae ʒ i

tube, and passed gently upwards into the bladder. The fluid is allowed to run, and by closing with the thumb the hole in the catheter for the return flow of water the bladder is distended as much as the patient can bear. Then the finger is taken off the opening and the fluid is allowed to escape. By repeating this process four or five times the bladder is emptied of the purulent accumulation which it contained. If a cystitis is not relieved by such treatment, the advisability of exploring the inside of the bladder with the finger, or of examining the mucous membrane through a cystoscope, must be considered (*v.* page 275).

Internally, the following drugs are recommended :—Benzoate of soda and of ammonia, both for their antiseptic effect and with the object of rendering the urine acid ; quinine, as a sedative and antiseptic ; salol and urotropin, as antiseptics ; and salicylate of soda, with the same object. In gonorrhœal cases, oil of sandal-wood and copaiba are of use.

In very chronic cases which have resisted all other methods of treatment, relief is sometimes obtained by making a fistula between the vagina and the base of the bladder. This ensures that the latter is kept empty, and also enables it to rest from its functions of alternately distending and contracting. This artificial vesico-vaginal fistula is allowed to remain open for a time varying from a few weeks to a few months. One objection to such a line of treatment—which undoubtedly will tend to cure the cystitis—is that it replaces one pathological condition by another, in that the patient has all the trouble and annoyance caused by a vesico-vaginal fistula. Another objection is that when the time comes to close the fistula, it is often found that the bladder has become so contracted that the patient has to pass water very nearly as frequently as when she was suffering from the cystitis itself.

THE URETHRA.

Vascular Caruncle.—Vascular or urethral caruncle (*caruncula*, dim. of *caro*, flesh) is the term applied to a small growth of a bright red colour, which is found on the posterior aspect of the urethral orifice. It is supposed to arise in connection with Skene's ducts—two small depressions situated in the floor of the urethra, and possibly to be the result of infection. It is usually about the size of a pea, and sometimes is pedunculated. Microscopically it is most frequently found to consist of angeiomatous tissue, and sometimes it resembles an adenoma.

Varieties.—Clinically, two varieties are met with:—painful (i) (ii) caruncles, and painless caruncles. It is said that the painless form may by treatment be turned into the painful form.

Symptoms.—The painless form gives rise to no symptoms, and is only discovered accidentally in the course of a vaginal examination. The painful form is characterised by burning pain during micturition, and is extremely tender to the touch. Either form may give rise to slight hæmorrhage.

Treatment.—The painless form should not be interfered with unless it is causing hæmorrhage. The painful form can be removed by means of a V-shaped incision (*v.* page 262), or by the actual or potential cautery.

PROLAPSE OF THE URETHRAL MUCOUS MEMBRANE.—This somewhat rare condition occurs in middle-aged and elderly women. In appearance, it somewhat resembles a caruncle. The latter is, however, usually limited to the posterior wall of the urethra, while in prolapse the entire orifice is surrounded by a red puffy ring.

Symptoms.—The principal symptoms, which this condition may cause, are burning pain on micturition, slight hæmorrhage, and tenderness to the touch.

Treatment.—Dissect off the prolapsed ring of mucous membrane, and suture the cut edge of the urethra to the vulvar mucous membrane by a continuous suture of fine silk or catgut (*v.* page 263).

CHAPTER IV.

DISEASES OF THE VULVA AND PERINÆUM.

The Vulva. Vulvitis—Catarrhal Vulvitis—Exudative Vulvitis. Phlegmonous Vulvitis—Herpes—Eczema—Pruritus Vulvæ—Elephantiasis—Kraurosis Vulvæ—Tumours: Benign Neoplasms; Malignant Neoplasms, Carcinoma, Sarcoma—Hæmatoma—Retention Cysts—Herniæ—Hydrocele of the Canal of Nuck—Tuberculosis of the Vulva. The Perinæum—Traumatisms of.

THE VULVA.

THE term vulva, or external genitals, is applied to the following parts:—the mons Veneris, the clitoris, the labia majora and minora, and the hymen. The various pathological conditions which are met with in this region are as follows:—

Vulvitis.
Herpes.
Eczema.
Pruritus vulvæ.
Elephantiasis.
Kraurosis.
Tumours.
Tuberculosis.

[illegible] wash

Parasitic
Scabies
Pediculosis

VULVITIS.

Vulvitis (*vulva*, the external female genitals) is the term applied to inflammatory conditions of the vulva.

Varieties.—In classifying vulvitis, as also in the case of vaginitis and endometritis, the author has endeavoured to adhere as closely as possible to a classification based on the pathological changes present, and to avoid diverging into classifications founded on the ætiology of the inflammation. The latter form of classification may have much to recommend it if it alone could be followed, but a combination of the two methods of classification has no recommendation whatsoever. On the contrary, to the prevalence of this mixed classification in gynæcological text-books, up to a comparatively recent period, is due a great deal of the difficulty which students find in acquiring a concise knowledge of gynæcology. Accordingly, vulvitis is classified in the following manner :—

(I) Catarrhal vulvitis.
(II) Exudative vulvitis.
(III) Phlegmonous vulvitis.

(I) CATARRHAL VULVITIS.—Catarrhal vulvitis is the most common variety of vulvitis with which we meet.

Pathological Anatomy.—Catarrhal vulvitis in its simplest form consists in the occurrence of a superficial erythema of the skin, accompanied, in proportion to the severity of the case, by a variable amount of epithelial desquamation and serous discharge. In this form, the vulvitis is usually known as *simple vulvitis*, and, as instances of it, may be mentioned vulvitis due to constant scratching, diabetic urine, or dirt. In a more severe form, as will be described under the head of vaginitis (*v.* page 42), the papillæ of the true skin become affected, as well as the superficial epithelium. The condition is then known as *granular vulvitis*, and is the usual form met with as a result of septic and gonorrhœal infection.

Ætiology.—The causes of catarrhal vulvitis may be roughly divided into those which come from above and those which come from below. In the first class, are included those inflammations or infections which extend downwards from the vagina or uterus, the constant irritation of the parts by irritating discharges coming from above, and the constant wetting of the parts by ammoniacal or diabetic urine. In the second class, are included such causes as dirt, constant scratching, masturbation, too frequent coitus, various traumatisms, parasites, and infection by the gonococcus, septic organisms, or fungi.

Symptoms.—The symptoms of common chronic catarrhal vulvitis are a sense of heat and burning in the parts, with a varying amount of pain, particularly after passing water, more or less intense pruritus or itching, slight tumefaction of the parts, and a varying amount of purulent or sero-purulent discharge.

In the acute form of gonorrhœal or septic vulvitis, all the above symptoms are more marked, and, in addition, there are the ordinary constitutional symptoms of septic absorption—rapid pulse, elevation of temperature, furred tongue, and general malaise.

Treatment.—Endeavour to remove the cause as far as possible by checking all irritating discharges coming from above. The vulvitis itself can then be relieved and cured by the adoption of extreme cleanliness and the application of any mild ointment, as Unguentum Oxidi Zinci, ichthyol ointment, or hazeline cream, to the irritated part. A greasy ointment, in addition to relieving the irritation of the inflammation, prevents discharge, urine, etc., from clinging to the skin. If there is no discharge from above, a dusting powder, consisting of a mixture of one part of oxide of zinc, one part of boracic powder, and two parts of starch powder, may be used instead. The following prescriptions may be found of use :—

℞ Zinci Oxidi,
Bismuthi Subcarb., āā ʒss
Acidi Carbolici, ♏x
Vasilini, ad ℥j
M. Ft. ung.
(*Wilson.*)

℞ Acidi Carbolici, ʒss
Hydrarg. Sulphidi Rubri, grs. viij
Sulphur. Sublim., ʒiij
Ol. Bergamot., ♏iv
Vaselini, ad ℥ij
M. Ft. ung.
(*Lassar.*)

℞ Resorcin, ʒij
Acidi Salicyl., gr. vj
Vaselini, ad ℥j
M. Ft. ung.
(*Ravogli.*)

℞ Zinci Oxidi, ʒij
Calaminæ Pur., ʒiv
Glycerini, ʒij
Aquæ Rosæ, ad ℥viij
M. Ft. lotio.
(*Wilson.*)

In acute gonorrhœal cases, the patient must be kept in bed, and the parts repeatedly bathed with an unirritating antiseptic lotion. Iodoform powder may be dusted between the labia, and, if the condition is complicated by vaginitis, as is nearly always the case, the latter must be treated as well.

(II) EXUDATIVE VULVITIS.—Exudative vulvitis is the term applied to a vulvitis which is characterised by the appearance over the parts of an exudation which is ˣmembranous or pseudo-membranous in character. It is identical in its ætiology and

x. Diphtheritic

x "Croupous Inflammation" of mucous membrane
after — Parturition — Septic Infection
Eruptive Fevers

character with exudative vaginitis, and rarely occurs except in conjunction with the latter (*v.* page 46).

(III) PHLEGMONOUS VULVITIS.—Phlegmonous vulvitis is also of the same nature as phlegmonous vaginitis, and hence it is not necessary to discuss it separately (*v.* page 47). One of the most common examples of it is the condition known as *noma pudendi*, which especially occurs in children after acute fevers.

HERPES.

An eruption of vesicles on the external genitals, identical with those found in herpes of other parts, is occasionally met with. The eruption is usually found on the internal surfaces of the labia majora and minora, on the vestibule and the hood of the clitoris, and at the orifice of the urethra. More rarely, it is found on the external surface of the labia majora and on the mons veneris, while in a few instances it has been noticed on the cervix. The vesicles may occur singly or in one or more groups, they vary in size from a pin's head to a hemp-seed and contain clear serum. When they burst, they leave small superficial ulcers behind, which, unless they are infected by gonorrhœal or other organisms, rapidly heal. The diagnosis of herpes is easily made if the vesicles are unruptured; when, however, they are broken and nothing left but groups of small ulcers, it may be difficult to at once distinguish between it and gonorrhœal or syphilitic ulceration. The herpetic ulcer is more superficial, rounder, and at its base smoother than is the syphilitic, while at the same time the discharge from it is less.

Treatment.—In the vesicular stage, all that is required is a mild saline purgative and the application of some cooling lotion or ointment to the herpetic patches. For the latter purpose, lead lotion or lead and opium lotion may be used with advantage. In the ulcerated stage, brushing the ulcers with a five to eight per cent. solution of nitrate of silver, followed by the application of Unguentum Oxidi Zinci, or any similar ointment, will hasten healing.

ECZEMA.

Eczema of the vulva is not an uncommon condition. It involves the labia and the clitoris, and may spread on to the mucous membrane of the lower part of the vagina, the adjacent skin of the thighs, and backwards over the perinæum to the anus. It may occur, as in other places, in an acute or chronic form—the latter being the more common. As predisposing causes to its occurrence, may be mentioned any irritation which leads to the scratching of the parts, undue friction of the parts by clothes, constant wetting by urine or vaginal discharge, or general want of cleanliness. The direct cause is the invasion of the deeper layers of the skin by the *Staphylococcus pyogenes albus.* In appearance, eczema of the vulva resembles eczema occurring in other places. It is, however, more difficult to obtain a complete cure here than elsewhere, on account of the difficulty of keeping the parts dry.

Treatment.—All causes which tend to produce or to keep up irritation must be removed. For this purpose, vaginal douches are administered in cases of vaginal discharge, and pathological conditions of the uterus or vagina are cured. With the same object, tampons soaked in a 10 per cent. solution of ichthyol in glycerine may be introduced into the vagina and removed every twenty-four hours. At the same time, a liniment containing carbolic acid (2 or 3 per cent.), or ichthyol (two drachms to the ounce) may be applied to the affected areas with the double object of sterilising the skin and of affording relief from the intense irritation which the eczema causes, or any of the numerous remedies, adopted in eczema of other parts, may be used instead. In eczema of the vulva, as in eczema of other places, it is difficult to arrive at once at the particular liniment or lotion which will afford the best results, and it is necessary to watch closely the effect of what ever particular form is prescribed and change, or continue, it according to the effect it produces. The following prescriptions may be found of use in different cases:—

Liniments.

℞ Acidi Carbolici, ʒj
Glycerini, ʒij
Alcohol, ℥ij
Aquæ Rosæ, ℥iv
M. Ft. linimentum.
(*Ravogli.*)

℞ Ichthyol, ʒij
Olei Amygdalæ Dulcis,
Aquæ Calcis, āā ʒiv
Glycerini,
Aquæ Rosæ, āā ℥j
M. Ft. linimentum.
(*Ravogli.*)

Ointments.

℞ Acidi Salicylici, grs. x
Zinci Oxidi,
Pulv. Amyli, āā ʒij
Vaselini, ℥ss
M. Ft. ung.
(*Lassar's paste.*)

℞ Resorcin, grs. x
Zinci Oxidi,
Pulv. Amyli,
Lanolini,
Vaselini, āā ʒij
M. Ft. ung.
(*Ihle's paste.*)

Amongst other drugs which have been found of value, may be mentioned prepared calamine (15 grs. to the ounce of water), subacetate of lead, Liquor Carbonis Detergens (ʒj to the ounce of water).

PRURITUS VULVÆ.

The term pruritus vulvæ is used in two different senses. It is used to express itching or irritation about the vulvæ—a symptom of many different conditions, and it is used to express a definite condition of the external genitals in which there is intense itching without any obvious alterations of the skin. The pathology of this condition was studied by Webster, and his researches show that though there is little or no change visible externally, there are extensive changes in the deeper layers of the skin. These changes are of the nature of a slowly progressing fibrosis, which affects principally the nerves and nerve endings of the clitoris and labia minora. The changes in the connective tissue are most marked in the corium under the papillæ, and are of the nature of a subacute inflammation. The cause of these changes is not understood, but will probably be found in some form of persistent irritation such as results from the continued passage of diabetic urine over the skin. The symptoms are those of intense irritation, which forces the patient to scratch and even to tear the parts. In consequence of the abrasions of the skin that result in this manner, eczema usually follows.

Treatment.—If any obvious cause for the condition can be discovered, it must be removed. Relief of the irritation may be obtained by the use of the same ointments and lotions which have been recommended in cases of vulvitis and eczema, especially perhaps by the use of glycerine and ichthyol. Cold applications, such as lead lotion, are sometimes successful, as may also be sitz baths containing bran, or an alkali such as biborate of soda or carbonate of soda. The following baths are recommended by MacNaughton Jones:—(1) Bran bath: bran, 2 lbs.; potato starch, ½ lb.; gelatine, 1 lb.; water at 100—105° F., 25—30 gallons. (2) Alkaline bath: carbonate of soda, 2 oz.; hyposulphite of soda, 2 oz.; potato starch, 4 oz.; water at 100—105° F., 25—30 gallons.

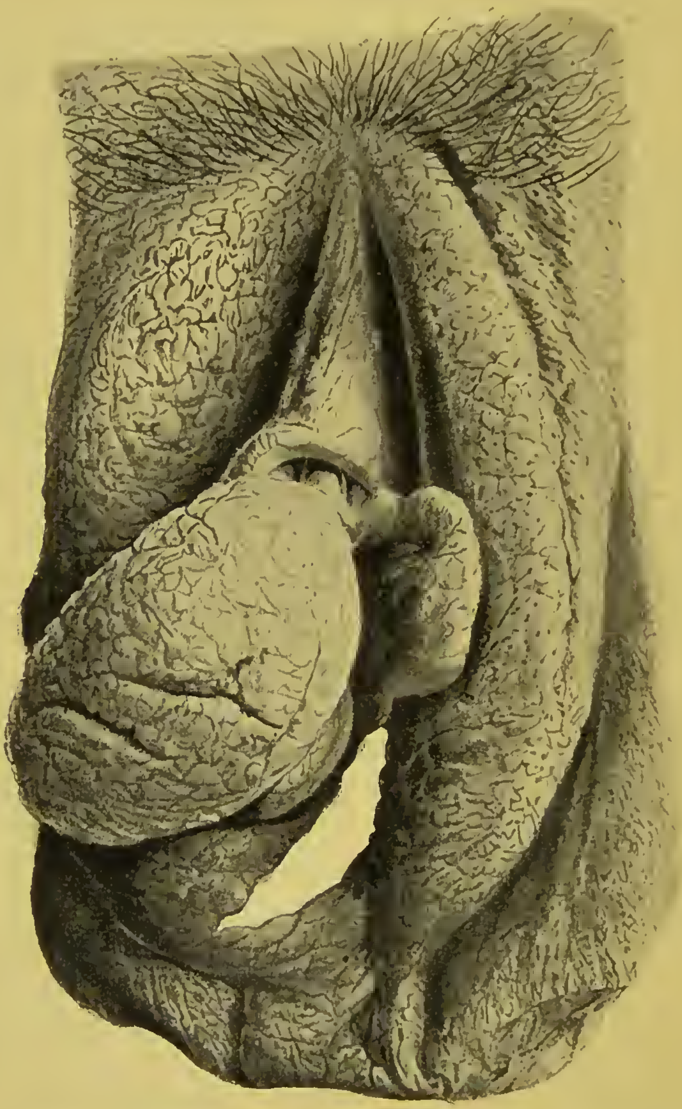


FIG. 11.—Pseudo-elephantiasis. The external organs of generation of a woman, showing hyperplasia of the nymphæ and neighbouring parts. (*Roberts.*)

ELEPHANTIASIS.

Elephantiasis is a condition which is rarely or never met with in its true form in these countries. As usually found, it consists in a local hyperplasia of the skin and subcutaneous connective tissue, with enlargement of the lymphatics (*v.* Fig. 11). Round the growth are sometimes found ulcers, which may eat away the neighbouring structures. In some cases, the clitoris alone is affected. It is said that, when elephantiasis is met with in these countries, it is almost invariably associated with tertiary syphilis.

Treatment.—Schroeder recommends excision of the affected tissue, beginning posteriorly and removing it piece by piece, the bleeding surfaces being brought into apposition by sutures.

KRAUROSIS VULVÆ.

Kraurosis vulvæ (κραῦρος, dry ; *vulva*) is the term applied by Breisky to an atrophic condition of the external genitals and perinæum. The skin becomes smooth and shining, small subcutaneous hæmorrhages appear, and finally the parts become very pale, and look as if they had been ironed out. The microscope shows an increase of fibrous tissue, leading to compression of the vessels and nerves. The papillæ of the skin are small, and the sebaceous and sweat glands have disappeared.

Pat

Symptoms.—The symptoms may be slight, or may be very well marked. They consist in tenderness and irritability of the parts, causing pain on coition and pruritus. As the atrophy of the tissues becomes complete, the symptoms gradually disappear. If pregnancy occurs, very extensive laceration of the diseased structures may take place during parturition.

Treatment.—The treatment of this condition is most unsatisfactory, but sometimes complete removal of the atrophied tissue has been attended by favourable results. Application of the cautery to the tender spots (the seats of the subcutaneous hæmorrhages) has also been followed by relief.

TUMOURS.

The true tumours, or neoplasms, met with in the region of the vulva are as follows :—

I. BENIGN NEOPLASMS.—The benign growths are all of rare occurrence, and only require to be enumerated :—

(1) *Lipoma,* growing from the fatty tissue of the mons Veneris and of the labia.

(2) *Myxoma,* growing from the labia, or occurring as an extension downwards of a myxoma of the bladder.

(3) *Angeioma,* growing from the blood-vessels. It is a very rare condition.

(4) *Fibroma,* growing generally from the labia majora, but sometimes from the nymphæ or perinæum.

(5) *Papilloma,* growing from any part of the vulva. It is generally multiple, and occurs as the result of irritating discharges coming from above, as in gonorrhœa.

(6) *Neuroma,* growing from the vulvar nerves. Like angeioma it is a very rare condition.

(7) *Enchondroma,* growing from the clitoris, also a very rare condition.

II. MALIGNANT NEOPLASMS.

(1) **Carcinoma.**—Squamous-celled carcinoma may be found on any part of the vulva, and not uncommonly grows from the clitoris. It ulcerates freely, and involves the inguinal glands at an early stage. It may be confused with inflamed papillomata, syphilitic ulceration, or lupus. If there is any doubt as to its nature, a small portion should be removed for microscopical examination. When the carcinoma starts in the clitoris, it is usually met with as a papillary, mushroom-shaped growth, and is generally ulcerated on the surface.

Cylindrical-celled carcinoma is a very rare condition. If it occurs, it starts in Bartholin's gland and rapidly invades the neighbouring tissues.

Treatment.—If seen at a sufficiently early stage, carcinoma should be extirpated freely. If it is too advanced for this, our treatment is directed towards checking the discharge as far as possible. This may best be done by freely curetting away the growth and then cauterising the base with nitric acid, chloride of zinc, or the actual cautery. If there is much hæmorrhage, it is checked by the application of plugs squeezed out of strong perchloride of iron.

(2) **Sarcoma.**—This is also very rare. When it occurs, it is

usually of the melanotic variety and arises from the labia majora.

In addition to the true tumours of the vulva, there are various false tumours or enlargements met with. They are as follows:—

I. Hæmatoma.
II. Retention cysts.
III. Herniæ.
IV. Hydrocele of the canal of Nuck.

I. Hæmatoma.—Hæmatoma of the vulva is caused by the rupture of a blood-vessel into the connective tissue, which, owing to its laxity, favours the escape of blood amongst its fibres. Hæmatoma most usually occurs as a result of parturition, but may also be due to external violence. It first appears as a small, bluish, and elastic swelling, which gradually increases in size as more blood escapes into it. It may reach an enormous size, and burst, if left untreated.

Treatment.—The patient should remain at rest in bed, and cold compresses be applied to the parts. If the swelling increases in size, it may be necessary to incise it, turn out the clots, and either close the cavity by means of sutures or plug it with iodoform gauze.

II. Retention Cysts.—A retention cyst results from the obliteration of the duct of Bartholin's gland. It may form either in the dilated duct or in the gland itself. It is found as an oval and tense swelling varying in size from that of a hazelnut to that of an egg, and containing a viscid fluid.

Treatment.—The usual treatment consists in excising the cyst completely, and then bringing together the walls of the cavity so formed by means of sutures passed below it. If the cyst has burrowed so deeply that its removal is dangerous or impossible, it is sometimes sufficient to make a free incision into it, evacuate its contents, and plug it firmly with iodoform gauze.

Mucous and sebaceous retention cysts are also met with, but they rarely attain to any considerable size.

III. Herniæ.—Three forms of hernia are met with in these regions:—

(1) *Inguinal Hernia* (*Hernia Labii Majoris Anterior*).—This is the term applied to herniæ which descend through the inguinal canal. They must be distinguished from hydrocele of the canal of Nuck.

(2) *Labio-vaginal Hernia* (*Hernia Labii Majoris Posterior*).—This descends through the pelvic diaphragm anterior to the broad ligament. It is liable to be mistaken for cysts of Bartholin's gland.

(3) *Perinæal Hernia.*—This form also descends through the pelvic diaphragm, but is posterior to the broad ligament.

IV. Hydrocele of the Canal of Nuck.—A hydrocele of the canal of Nuck is the term applied to a collection of fluid in the pouch of peritoneum which follows the round ligament into the labium. It is not a condition of much importance, save that it may be mistaken for an inguinal hernia. It differs from the latter in having no impulse on coughing, and in not being affected by change of position, whereas an inguinal hernia tends to reduce itself when the patient lies down.

Treatment.—If the fluid is increasing, it may be drawn off with an aspirating needle, under careful asepsis. If the condition recurs, the sac should be cut down upon and dissected out, and the wound closed with a continuous catgut suture.

TUBERCULOSIS.

Tuberculosis of the vulva, or lupus, occurs in three forms (Figuet) :—

(1) A superficial form, characterised by the appearance of deep red patches, or of small prominences, varying in size from that of a lentil to that of a shilling. These tend to coalesce and then to ulcerate in the centre. The ulcerations extend in a serpiginous manner, and tend to heal at the older end of the track, which they thus form, while the other or younger end is always advancing further.

(2) A deep form, in which the ulcerations tend to extend more and more deeply into the tissues rather than superficially.

(3) A hypertrophic form in which there is marked increase in size of the affected parts, especially the labia majora and minora.

Treatment.—Destruction of the growth by the curette and actual or potential cautery, or complete excision with the knife, are the two most suitable forms of treatment. In addition every effort must be made to increase the patient's strength, as in other forms of tuberculous disease.

THE PERINÆUM.

The perinæum is the term applied to the cutaneous and subcutaneous structures lying between the posterior fourchette and the anterior margin of the anus. The only important pathological condition met with is the result of the laceration which almost invariably occurs during first labours. As a rule this laceration is so slight as to be of no importance, involving only the posterior fourchette, but in some cases it may extend so far back as to reach, or even involve, the anterior rectal wall. Lacerations extending beyond the fourchette should always be sutured immediately after delivery. If this is not done, or if after it has been done the torn edges do not unite, the condition known as chronic rupture of the perinæum occurs. This condition, which is frequently the precursor of uterine prolapse, will be discussed in the chapter on genital traumatisms (*v.* page 205).

CHAPTER V.

DISEASES OF THE VAGINA.

Vaginitis—Catarrhal Vaginitis; Pathological Anatomy, Ætiology, Symptoms, Treatment, Complications—Exudative Vaginitis; Symptoms, Treatment—Phlegmonous Vaginitis; Symptoms, Treatment—Emphysematous Vaginitis—Vaginismus; Ætiology, Symptoms, Treatment—Tumours; Benign Neoplasms—Malignant Neoplasms; Carcinoma, Sarcoma—Vaginal Cysts—Hæmatoma—Tuberculosis.

THE various pathological conditions which are met with in the vagina are as follows:—

Vaginitis.
Vaginismus.
Tumours.
Traumatic lesions.
Tuberculosis.

VAGINITIS.

Vaginitis is the term applied to any inflammatory condition of the vaginal mucous membrane or subjacent connective tissue.

Varieties.—The following varieties of vaginitis, classified according to their anatomical peculiarities, are met with:—

I. Catarrhal.
II. Exudative.
III. Phlegmonous.
IV. Emphysematous.

I. CATARRHAL VAGINITIS.—Catarrhal vaginitis is the commonest variety of vaginitis with which we meet.

Pathological Anatomy.—In the earliest stage of catarrhal vaginitis, the papillæ of the vaginal mucous membrane become the seat of a small-celled infiltration. This causes them to increase in size, while the accompanying hyperæmia produces a more or less marked exfoliation of the epithelium. If only the superficial layers are thus thrown off, the condition is known as *simple vaginitis*. If the inflammation is more severe, the papillæ i. continue to increase in size, and tend to coalesce, while their epithelial covering is almost or completely destroyed. As a result, the vaginal walls are covered with numerous small projections, which are seen under the microscope to consist of embryonic tissue. To this stage, the name *granular vaginitis* is given. A ii third form of catarrhal vaginitis is met with under the name *senile or adhesive vaginitis*. In this form, the enlargement of the iii papillæ is not so marked as in granular vaginitis, but on the other hand the epithelium is thrown off down to its deepest layer. The result of this complete denudation is that the vaginal walls become adherent to one another and that the canal is partially or completely obliterated, or, if only isolated areas become adherent, bands may be formed traversing the vagina in various directions.

Accordingly, we see that catarrhal vaginitis is met with under three forms :—

(1) Simple catarrhal vaginitis.
(2) Granular catarrhal vaginitis.
(3) Senile or adhesive catarrhal vaginitis.

Ætiology.—The causes of catarrhal vaginitis will fall under two heads :—

(1) Predisposing causes.
(2) Exciting causes.

(1) Under normal circumstances, the vagina is lubricated by a fluid composed of a transudation of lymph-serum and of desquamated epithelial cells. It is acid in reaction, due to the presence of lactic acid, and is found to contain numerous rod-shaped bacilli—the vagina or lactic acid bacillus—and *Monilia candida*, a non-pathogenic fungus which can only develop in the presence of the vagina bacillus. This discharge, which is a thin opalescent fluid, is capable of preventing the development of saprophytic or pyogenic organisms. Pathological vaginal discharge on the other hand is alkaline or neutral in reaction, contains no vagina bacilli or monilia, but does contain swarms of saprophytic organisms, staphylococci, streptococci, and sometimes gonococci.

As it has been definitely proved that the normal vaginal discharge possesses powerful antiseptic properties, which properties are in the main due to the formation of lactic acid by the vagina bacillus, and as in all probability all forms of vaginitis are due to bacterial invasion, the predisposing causes of vaginitis must be looked for under the head of any factor which tends to neutralise or to render alkaline the normal discharge. The vaginal discharge can be made alkaline in three ways:—by the presence of 1. blood; by increased serous transudation from the vaginal walls 2. or uterus; or by the frequent removal of the acid-producing 3. bacilli. The presence of blood in the vagina occurs physiologically during menstruation and the puerperium, pathologically as a result of uterine disease, new growths of the vagina, or traumatisms. Increased serous transudation may also arise from some pathological condition of the uterus, or from mechanical irritation of the vagina causing congestion of the mucous membrane or stripping of the epithelium. Such an irritation may result from badly fitting or too long worn pessaries, the presence of any foreign bodies, excessive coition, or frequent vaginal examinations, etc. A gaping condition of the vulva is usually found as a predisposing cause of the mycotic form of simple vaginitis. The frequent removal of the protective bacteria will be brought about by constant vaginal douching.

(2) The direct exciting cause of catarrhal vaginitis is undoubtedly the introduction of bacteria into the vagina. The latter may be introduced when any foreign body is passed into the vagina, or may travel upwards by direct extension from an antecedent vulvitis or cystitis, or downwards from an antecedent endometritis. In gonorrhœal infection, which is the commonest cause of the severe forms of catarrhal vaginitis, the cocci in all probability lodge first in the epithelium of the cervix or of the urethra, as the compound squamous vaginal epithelium offers a greater bar to their invasion. They set up there a profuse catarrh, and this pouring into the vagina overcomes the action of the vagina bacilli, washes away the superficial layers of the protecting epithelium, and so permits the gonococci to develop secondarily in the deeper layers.

In addition to the gonococcus, the following forms of bacteria are also found as causes of vaginitis:—Staphylococcus, streptococcus, *Bacillus coli communis*, various forms of diplococcus, and saprophytic bacteria. Various forms of fungi are also met with, which give rise to a form of simple catarrhal vaginitis known as *mycotic vaginitis.* These are,—*Oidium albicans, Leptothrix vaginalis,* and under certain conditions *Monilia candida.*

Symptoms.—The principal symptoms of simple vaginitis consist in a feeling of weight and pain in the pelvis, slight serous discharge, tenderness of the parts, and marked injection and hyperæmia of the mucous membrane. If the condition is due to the implantation of colonies of fungi, the vaginal walls are scattered over with white patches, looking as if flour had been dusted here and there on to them. These patches are the colonies of the invading fungus.

In the granular form, the foregoing symptoms are very much more marked, especially in the acute stage. This is characterised by extreme pain, swelling, and inflammation of the parts, by profuse purulent discharge, by elevation of the temperature and pulse rate, and by the general symptoms of septic absorption. The symptoms of the chronic stage of granular vaginitis and of senile or adhesive vaginitis are very much akin. In both there is a feeling of weight and pain in the pelvis, accompanied by a burning sensation in the vagina. There is also a more or less profuse discharge, generally purulent in granular vaginitis, sometimes sanious in senile vaginitis.

Treatment.—In the acute stage of gonorrhœal vaginitis, it is often impossible to adopt any local treatment on account of the extreme tenderness of the parts In such cases, all that can be done is to keep the patient at rest in bed, and, if possible, to administer vaginal douches. Such douches should be given at a temperature of about 90° F. and with a low pressure of water. If the patient can bear it, they should contain an antiseptic, but frequently it is only possible to use plain water. The most frequently used antiseptics are:—creolin (0·3 per cent.), carbolic acid (1 or 2 per cent.), and boracic acid (saturated solution). In addition to douching, pencils of iodoform may be placed in the vagina, also cotton-wool plugs soaked in a 10 per cent. solution of ichthyol in glycerine, or, in septic cases, a tampon of iodoform gauze. Pain can be relieved by hot compresses applied over the lower portion of the abdomen, by hot sitz-baths, and, if necessary, by means of opiates. As the acute stage passes off, the strength of the injections may be increased. Pyroligneous acid, sulphate of copper (20 grs. to the ℥j), nitrate of silver (10 per cent.), formalin (2 to 4 per cent.), lactic acid (3 per cent.) (Sneguireff), protargol (2 to 4 per cent.) may be applied through a cylindrical speculum. This speculum should always be the largest size that the patient can bear, in order to distend the vaginal walls as far as possible, and so allow the fluid to come more perfectly into contact with their entire extent. A saturated solution of boracic acid, or a weak solution of boro-glycerine or permanganate of potash, is the most suitable form of antiseptic in mycotic vaginitis.

Complications.—Simple and adhesive vaginitis run a practically uncomplicated course; gonorrhœal vaginitis, on the other hand, is prone to give rise to the most serious complications. Of these, the chief danger is the extension of the infection upwards, first into the uterine cavity, then into the tubes, and lastly into the pelvis, or perhaps the general peritoneal cavity. As a result of this extension, there may occur gonorrhœal endometritis, salpingitis (either with or without the formation of a pyosalpinx), abscess of the ovaries, pelvic peritonitis, and general peritonitis. As remoter results of this extension, there may occur adherent retro-deviations of the uterus, fixed ovaries, tender and shortened posterior ligaments, and sterility from occlusion of the fimbriated extremities of the tubes. Other complications consist in the infection of the bladder or of the whole urinary tract, and of the eyes, and in the occurrence of gonorrhœal rheumatism.

II. Exudative Vaginitis.—Under this head, is included that variety of inflammation of the vaginal mucous membrane which is membranous or pseudo-membranous in character. In the membranous form, the mucous membrane is the seat of a true diphtheritic inflammation, occurring as a complication of diphtheria, and usually found in association with diphtheritic vulvitis. In the pseudo-membranous form, the mucous membrane is the seat of a croupous inflammation, a condition which is most frequently met with after parturition as the result of septic infection. It also occurs after various eruptive fevers, as measles, scarlatina, and smallpox.

Symptoms.—In either form, the vagina is covered by a grey membrane, which can be readily detached in the pseudo-membranous form. There is usually extreme tenderness of the parts and a profuse fœtid discharge, high temperature, and the constitutional symptoms of septic or diphtheritic infection.

Treatment.—Frequent vaginal douches containing an unirritating antiseptic should be administered. In the septic form, the plugging of the vagina twice a day with iodoform gauze is the best treatment. Iodoform pencils may also be introduced into the vagina, and the head of the patient's bed should be raised in order to facilitate the escape of the discharge.

III. Phlegmonous Vaginitis. — Phlegmonous vaginitis, or perivaginitis, is the term applied to that variety of vaginitis in which the infection has extended into the sub-epithelial connective tissue surrounding the vaginal canal. It may be septic or gonorrhœal in origin.

Symptoms.—The vaginal walls are indurated and perhaps œdematous, and fluctuation may be obtained in places, showing the presence of pus. The constitutional disturbances produced by septic absorption are well marked. The severity of the case depends upon the virulence of the infecting bacterium, and in some cases this may be so great as to cause the death of the patient. Fistulæ may result from extensive sloughing, and, in very rare cases, where the inflammation extends all round the vagina, the latter may be detached and thrown off as a slough (Marconnat).

Treatment.—In the early stage, hot antiseptic vaginal douches should be given, and plugs soaked in glycerine and ichthyol may be placed in the vagina. If pus forms, it must be allowed to escape by means of free incisions. The patient's strength must be supported by administering plenty of nourishment, and by the free use of stimulants.

IV. Emphysematous Vaginitis.—This condition was described by Winckel, and named by him *kolpo-hyperplasia cystica.* It consists in the formation of small cysts, containing gas, under the mucous membrane of the vagina. It is a very rare condition, and is most frequently found in pregnant women. The cysts are met with in groups, and occur generally on the upper part of the anterior wall of the vagina. They convey a crepitatory feel to the fingers, and the mucous membrane round them is somewhat inflamed. The pathology of this condition is extremely obscure. It has been suggested that the cysts are formed from dilated lymph channels (Chiari), and that the gas is derived from molecular disintegration of the tissues (Pozzi), or from the outer air; in the latter case, the air would gain admittance through microscopic cracks in the mucous membrane. There is no special treatment required.

VAGINISMUS.

Vaginismus was first described by Marion Sims, and was defined by him as "an excessive hyperæsthesia of the hymen and vulvar outlet, associated with such spasmodic contraction of the sphincter vaginæ as to prevent coition."

Ætiology.—In the great majority of cases of vaginismus, some local condition of the vulvar or vaginal orifice can be found. In a small number, however, no such condition can be detected even on the most careful examination. Such cases are usually met with in hysterical patients, and are attributed to some neurotic condition. Amongst the local conditions which are found are vulvitis, vaginitis, atresia of the vaginal orifice, inflamed carunculæ myrtiformes, fissures, polypi, prolapse of the ovaries into Douglas' pouch, cysts or abscesses of Bartholin's gland, and urethral caruncles. A very rare cause, to which attention has been called by Hegar and Kaltenbach, consists in an unusual amount of obliquity of the vaginal orifice, which brings the clitoris into such a position that it is subject to direct pressure during coition. Impotence and awkwardness on the part of the husband have also been mentioned as a cause of vaginismus.

Symptoms.—The most marked symptoms are extreme pain during any attempt at coition (dyspareunia), and such spasmodic contraction of the vaginal muscle as to prevent coition. On examination, it is sometimes found to be impossible to pass the finger into the vagina, both on account of the pain such an attempt causes and of the spasmodic contraction of the vaginal sphincteric muscles. If the cause of the vaginismus lies in some condition which is situated outside the vaginal sphincter, it can usually be easily determined. If, however, it lies above this, an anæsthetic must be administered.

Treatment.—If the cause of the vaginismus can be discovered, and if such cause can be removed, the patient as a rule will be cured. If no cause can be discovered, the treatment is very much more difficult. Vulvitis or vaginitis must be cured. Inflamed carunculæ myrtiformes must be dissected out or destroyed with a cautery. Enlargements of Bartholin's gland must be removed. Atresia of the vaginal orifice is best overcome by dilatation with Marion Sims' glass dilators (*v.* Fig. 12), after first incising the constricting tissues round the edge of the hymen. The dilator, which somewhat resembles a large-sized Hegar's dilator, is worn for from three to six hours at a time, and is inserted daily for a period varying from a week to a fortnight. If there is any difficulty in obtaining them, iodoform gauze may be used instead. In purely neurotic conditions, sedatives may be tried and complete cessation from marital relations for a time. If this fails, relief may be obtained by the excision of the hymen, even though there is no apparent pathological condition present.

Fig. 12.—Marion Sims' glass vaginal dilator for use in vaginismus.

TUMOURS.

The true tumours or neoplasms which are met with in the vagina are as follows:—

I. Benign Neoplasms.

(1) *Lipoma,* growing from the fatty tissue of the vaginal wall. It is a very rare condition.

(2) *Fibroma and fibro-myoma,* growing from the wall of the urethra and from the upper part of the vagina. These are also exceedingly rare, but sometimes occur as pedunculated or sessile growths.

II. Malignant Neoplasms.

(1) **Carcinoma.**—Cancer of the vagina occurs as a primary condition, and as such is extremely rare. It is also found comparatively commonly as a secondary condition, due to extension of carcinoma of the cervix. Here, we are alone concerned with the primary condition.

Pathological Anatomy.—Primary carcinoma of the vagina may start from any part of the vaginal mucous membrane; most frequently, however, it commences either at the vulvo-vaginal junction or at the top of the posterior *cul-de-sac*. If it starts in the former situation, it involves the recto-vaginal septum, then invades the rectal wall, and finally causes a recto-vaginal fistula. If it starts in the latter situation, it rapidly spreads to the vaginal portion of the cervix. Clinically, it tends to assume one of two forms (Pozzi):—

(*a*) A vegetating or papillary form, which starts as a small papillary projection, grows out in masses resembling the cauliflower excrescences found in cancer of the cervix, and rapidly ulcerates.

(*b*) An infiltrating or nodular form, which starts as a small more or less circular area of infiltration, tends to grow in or beneath the epithelium instead of coming to the surface, and finally sends out papillary projections which ulcerate as in the previous form.

Symptoms.—The symptoms of primary malignant disease of the vagina, as of the cervix, are at first very ill-defined. As a result these cases are rarely seen in time for operation. The patient first notices a blood-stained discharge, which gradually becomes more and more profuse. If the growth is sloughing, there is a profuse sanious discharge, and, if the ulcerative process opens any of the vaginal vessels, there may be serious hæmorrhage. The inguinal glands are early affected.

Treatment.—If the nature of the case is detected in time to afford any hope of a cure, the growth must be excised as widely as possible, and the mucous membrane brought together again by suture. If the cervix is involved, it may be sometimes possible to extirpate the tumour by combining abdominal hysterectomy with a free removal of the vaginal wall, as in the operation described by Werder (*v.* page 354). If the case is inoperable, temporary relief will be given by freely curetting away as much of the growth as possible, and then destroying the base of the ulcer so formed with the actual cautery or by the application of strong caustics (*v.* page 335).

(2) **Sarcoma.**—Sarcoma of the vagina is even rarer than primary cancer. It occurs as a diffuse sarcoma attacking the vaginal mucous membrane, or as a more localised or even pedunculated growth—the result of the degeneration of a fibroma.

The course of this condition is slow. If possible the growth should be freely extirpated.

In addition to the true tumours of the vagina various false tumours or enlargements are met with. They are as follows :—

I. Cysts.
II. Hæmatoma.

I. Vaginal Cysts.—Cysts situated beneath the mucous membrane of the vagina and around the orifice of the urethra are frequently met with. They vary in size from that of a hazel-nut to that of a full-term fœtal head, but the smaller sizes are much the more common.

Ætiology.—The ætiology of these cysts is still somewhat obscure. Four theories as to their causation have been brought forward :—

(1) That they are retention cysts due to the blockage of the duct of a gland (Huguier, Virchow).

(2) That they are due to the dilatation of lymphatic interspaces (Jakesch), in which case they would have an endothelial lining.

(3) That they are hygromata (Kaltenbach), that is an accumulation of lymph between the connective-tissue cells, in which case they would have no lining membrane, either endothelial or epithelial. In opposition to both this and the previous theory, is the fact that the cysts are almost invariably lined with cylindrical epithelium.

(4) That the cysts are formed by the dilatation of two sets of embryonic ducts, which are found in relation to the vaginal wall. These are—the ducts of Gartner and the ducts of Skene. The former are the counterpart of the vasa deferentia in the male, and run downwards from* the broad ligament beside the vaginal walls, one at each side. The latter open into two small depressions, one at either side of the urethral orifice, and are the counterpart of the prostatic ducts in the male (*v.* Fig. 13). This theory affords the most probable explanation of the ætiology of vaginal cysts.

Parov

In addition to these cysts there is another form met with, namely, cysts due to the implantation of echinococcus colonies. (5) This form, in common with all instances of hydatid infection, is very rare in these countries.

Treatment.—The treatment of vaginal cysts resembles the treatment of vulvar cysts. If they are small and are not causing any symptoms they may be left alone, otherwise they are best removed (*v.* page 306). This is done by dissecting out the cyst wall, and then suturing up the resultant cavity. In the case of a large cyst which has extended downwards from the broad ligament, it may be necessary to open the abdomen to render its removal possible. If the cavity cannot be closed by suture after the cyst has been removed, it must be plugged with gauze.

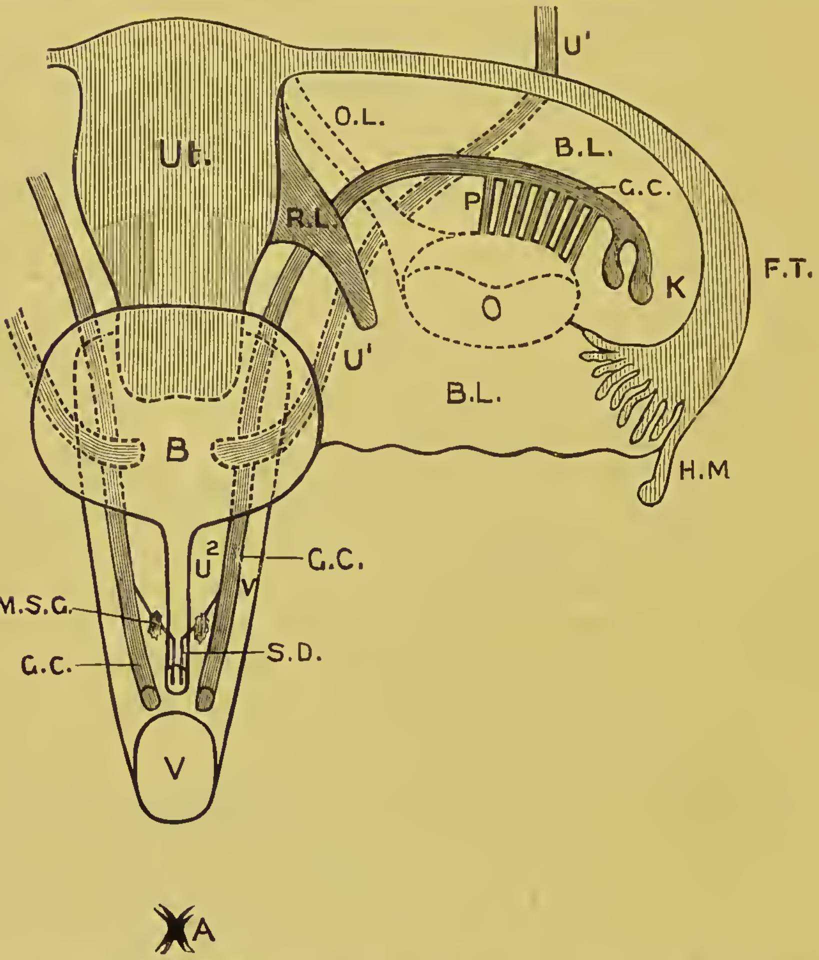


Fig. 13.—Diagram representing the fœtal structures in the broad ligament and vagina in relation to the origin of parovarian and vaginal cysts. (*A. Routh*). Ut. Uterus. B. Bladder. U^1. Ureter. U^2. Urethra. S.D. Skene's ducts. V. Vagina. G.C. Gärtner's canals. M.S.G. Max Schüller's glands. K. Kobelt's tubules. A. Anus. B.L. Broad ligament. O. Ovary. O.L. Ovarian ligament. R.L. Round ligament. F.T. Fallopian tube. H.M. Hydatid of Morgagni. P. Vertical tubes of parovarium.

Some authorities recommend, in the case of a small cyst, to excise a portion of its wall instead of dissecting the whole cyst out. They claim that this method answers just as well and is safer.

II. Hæmatoma.—Hæmatoma vaginæ may be met with as the result of a traumatism occurring during parturition. It is a purely obstetrical complication, and accordingly will not be discussed here.

TRAUMATIC LESIONS OF THE VAGINA.

Traumatic lesions of the vagina are so closely bound up with those of the perinæum and uterus, that they will be discussed together (*v.* page 205). Here it is only necessary to mention the fact that they sometimes occur.

TUBERCULOSIS OF THE VAGINA.

Tuberculosis of the vagina is a very rare affection. It is, however, sometimes met with either as a primary condition, or secondary to tuberculous disease of the vulva or uterus. It occurs as an irregular ulcer with sharply cut edges, its base covered by a caseous discharge (Weigerst). A final diagnosis can be made by examining this discharge for tubercle bacilli, or by removing a portion of the base of the ulcer and examining it microscopically.

Treatment.—If possible the ulcers should be freely excised. If or that cannot be done, they may be destroyed by means of nitric acid or the actual cautery.

CHAPTER VI.

DISEASES OF THE UTERUS.

Errors of Development. Congenital Absence of Uterus—Double or Bipartite Uterus, Treatment—Stenosis of the Cervical Canal, Symptoms, Treatment —Congenital Atrophy of the Uterus—Infantile Uterus—Congenital Atresia of the Cervix—Congenital Hypertrophy of the Cervix; Treatment.

The pathological conditions met with in the uterus will be considered under the following headings:—

Errors of development.
Displacements.
Traumatic lesions.
Inflammatory diseases.
New growths.
Tuberculosis.

ERRORS OF DEVELOPMENT.

Under the heading Errors of Development the following conditions are included:—

I. Absence of (1) uterus, (2) ovaries, (3) uterus and ovaries.
II. The various forms of double or bipartite uterus.
III. Stenosis of (1) external os, (2) internal os, (3) entire cervical canal.
IV. Congenital atrophy of the uterus.
V. Infantile or fœtal uterus.
VI. Congenital atresia of the cervix, or of one side of a double cervix.
VII. Congenital hypertrophy of the cervix.

I. Congenital Absence of Uterus, etc.—Congenital absence of the uterus, or ovaries, alone, or of the uterus and ovaries, is a very rare condition. In some cases, it is accompanied by absence of the vagina as well. These conditions are only of diagnostic interest, as there is naturally no treatment of any avail.

II. Double or Bipartite Uterus.—The various forms of double or bipartite uterus are not of any great gynæcological interest. They only become of importance under certain circumstances:—

(1) If they cause trouble during pregnancy or parturition.
(2) If there is an atresia of any portion of the cervix or vagina on one or both sides, leading to retention of the menstrual products.
(3) If they give rise to a difficulty in diagnosis whilst making a vaginal examination.

Treatment.—The only case in which any question of treatment might occur would be in those cases in which there was a retention of the menstrual products. Such cases will be discussed under genital atresiæ (*v.* page 216).

III. Stenosis of the Cervical Canal.—Congenital stenosis (στένος, narrow) of the cervical canal, or of any part of it, is most usually the result of imperfect development of the uterus, and is associated with acute anteflexion, as the latter condition is sometimes produced by imperfect development of the anterior uterine wall. Acquired stenosis may occur as the result of the improper use of caustics, or after a too extensive trachelorrhaphy, or amputation of the cervix.

If the cervical canal is of its normal size, there should be no difficulty in passing a sound 4 mm. in diameter into the uterus, if the sound is properly directed (Schultze). If this cannot be done, stenosis of that portion of the canal at which the obstruction is found is diagnosed.

Symptoms.—The chief symptoms of stenosis of the cervical canal are dysmenorrhœa and sterility. The dysmenorrhœa is usually worse at the commencement of the period, and becomes less as the flow is established. It is most probably due, as Sims said, to the painful contractions of a uterus endeavouring to overcome the mechanical obstruction to the outflow of the menstrual products. It has been vigorously denied by many authorities that stenosis sufficient to cause obstruction ever occurs as a congenital condition. We have already referred briefly to the obstructive theory of dysmenorrhœa (*v.* page 22). Whether such a theory is true or not is an unsettled point, but, in our opinion, the balance of evidence is in its favour, and in practice the best results are obtained by acting on the principle that it is true.

Sterility is in all probability caused by the endometritis which almost invariably accompanies this condition, and also by the fact that stenosis of the os externum will prevent the eversion of the mucous membrane of the cervix which is said to normally occur during coition (Dührssen). As such an eversion, with the subsequent retraction of the mucous membrane, must be, if it occurs, an important factor in the introduction of spermatozoa into the cervical and hence into the uterine cavity, it follows that when it does not occur the spermatozoa lie for a longer time than usual exposed to the action of the acid vaginal mucus. This in itself is sufficient to kill them.

Treatment.—The extent to which the treatment of these cases should be carried is often a matter of dispute. Stenosis of the cervical canal does not in itself endanger life, and therefore there is often a certain amount of reluctance in adopting operative measures, which, although practically safe in competent hands, have theoretically a certain amount of risk attached to them. Then, again, many of these cases occur in young unmarried girls, and consequently there is always a difficulty in making the necessary examination. As a result, in many cases palliative treatment is commenced, and is continued for an unduly long time, with the result that the patient is kept in a condition of semi-invalidism, which may end in making her of a confirmed neurotic disposition; or, what is very much worse, she may be led into the habit of constantly taking sedatives, and so end as a morphia maniac.

The author hopes that this expression of opinion will not be taken to mean that he condemns all palliative measures, as, on the contrary, he recognises the fact that by such means the dysmenorrhœa associated with the stenosis can be completely overcome in some cases. He merely wishes to protest against the ill-advised continuance of palliative treatment in those cases in which a but temporary relief is brought about.

Palliative Treatment.—The palliative treatment of stenosis consists in rest in bed during the menstrual period, the application of glycerine plugs to the cervix for a few days before the period is due, hot douches, sitz baths and the use of sedatives, as bromide of potash, hyoscine, morphia, chloral, etc. If these means fail, not alone to relieve the patient temporarily, but also to prevent the recurrence of the condition, the advisability of adopting operative measures must be considered.

Radical Treatment.—The form of radical treatment which is adopted depends upon the situation of the stenosis. If the latter is situated at the os externum, bilateral division (*v.* page 318), or, if the cervix is elongated, amputation of a portion of it by Simon-Marckwald's method (*v.* page 313) is the best line of treatment. If there is stenosis of the entire cervical canal, posterior division as recommended by Marion Sims is the best operation (*v.* page 319). If there is much accompanying anteflexion of the uterus, the modification of Sims' operation which has been suggested by Dudley is more suitable (*v.* page 320). The most difficult cases to treat are those in which there is marked stenosis of the internal os. It is to these cases that dilatation is perhaps the most suited (*v.* page 322), but unfortunately its effects are usually only temporary. If it fails, Dudley's modification of posterior division may give better results.

It is always well to remember that, if any form of operative treatment is adopted in these cases, the uterus must be curetted as well, in order to cure the endometritis which is almost always present.

IV. Congenital Atrophy of the Uterus.—In this condition, the uterus preserves its normal shape, but is very much smaller than usual and its walls are very thin (Dührssen). The condition is found in those severe forms of chlorosis with which are associated congenital smallness of the heart and aorta (Virchow).

The symptoms to which such a condition gives rise are amenorrhœa or scanty menstruation, and sterility. The diagnosis is made by means of a bimanual examination and by measuring the uterus with the sound. Treatment is generally believed to be useless.

V. Infantile Uterus.—In the condition known as infantile or fœtal uterus, the uterus maintains permanently the shape which it normally possesses up to the time of puberty. That is to say the cervix is abnormally long and thick, in comparison with the thin-walled and small uterine body. Conical cervix, and stenosis of a part or the whole of the cervical canal, are also frequent concomitants.

Symptoms.—The symptoms which an infantile uterus causes are dysmenorrhœa, scanty menstruation, and sterility. The dysmenorrhœa is usually stated to be due to the compression of nerve filaments by an imperfectly developed uterine muscle and endometrium during menstrual congestion of the uterus. It may also be the result of the stenosis of the cervical canal and of the acute anteflexion of the uterus, both of which are as a rule consequent on the imperfect uterine development. Scanty menstruation is the natural result of the deficient blood supply of the uterus, while sterility is in all probability caused by an accompanying imperfect development of the ovaries.

Treatment.—The treatment is directed to the overcoming of the cervical stenosis, as previously described (*v.* page 56), and to attempting to stimulate the uterine body to development. The latter may be brought about by frequent hot intra-uterine douches, by plugging the cavity with iodoform gauze, and by faradisation with the negative pole of the battery inside the uterus, but, as a rule all treatment is unsatisfactory.

VI. Congenital Atresia of the Cervix.—Congenital uterine atresia is a very rare condition. It will be described under "Genital Atresiæ" (*v.* page 216).

VIII. Congenital Hypertrophy of the Cervix.—In congenital hypertrophy of the cervix, the length of the latter is as a rule principally affected, while its thickness remains comparatively unaltered. Elongation is due to a hyperplasia and hypertrophy of the muscle fibre and connective tissue of the infra-vaginal portion (*v.* page 70), the mucous coat as a rule remaining unaffected. There is usually some degree of stenosis of the canal as well.

Treatment.—Treatment consists in amputation of the hypertrophied portion by Simon-Marckwald's method (*v.* page 313). As a rule, it will suffice to remove some of the overgrowth, as the resultant involution, which follows on this, will cause the remainder to disappear.

CHAPTER VII.

DISEASES OF THE UTERUS (*continued*).

Displacements of the Uterus. Definitions of Terms—Normal Positions of the Uterus—Table of Displacements—Upward Displacement; Ætiology, Symptoms, Treatment—Downward Displacements; Ætiology, Pathological Anatomy, Symptoms, Treatment—Backward Displacements: Retroversion and Flexion, Ætiology, Symptoms, Diagnosis, Treatment; Retroposition—Forward Displacements; Anteversion and Flexion, Ætiology, Symptoms, Treatment; Anteposition—Lateral Displacements of the Uterus: Dextro- or Sinistro-version or Flexion, Ætiology, Treatment—Torsion—Inversion: Degrees, Varieties—Acute Inversion; Ætiology, Symptoms, Diagnosis, Treatment, Prognosis—Chronic Inversion; Ætiology, Symptoms, Diagnosis, Treatment.

DISPLACEMENTS OF THE UTERUS.

There are certain terms in common use to convey the various positions of the uterus, which must be clearly understood. The first of these are the terms *version* and *flexion* of the uterus. In order to convey a definite impression of the meaning of these terms the uterus must be considered as consisting of two parts or segments,—a body, and a cervix, each of which is traversed by an imaginary longitudinal axis (*v.* Fig. 14). In consequence of the somewhat lax attachments of the lower segment, *i. e.* the cervix, to the surrounding parts, its axis possesses a considerable range of motion, so that it can move through some 180 degrees in the manner shown in the accompanying diagram (*v.* Fig. 15). Also, as a result of the flexile nature of the uterine tissues at the junction of the two segments, their respective axes may adopt various relations to one another, and may either coincide or may meet each other at almost any angle. By *version*, is meant the inclination of the axis of the lower segment in any direction away from the vertical. If the cervical axis is vertical, version is absent; if it is inclined forward, the uterus is said to be in a position of anteversion; if backwards, of retroversion; if to the right, of dextroversion; and if to the left, of sinistroversion (*v.* Figs. 15, 16). By *flexion*, is meant a similar inclination of the axis of the upper segment away from the axis of the lower segment, and the term is again qualified by the same prefixes as is version—anteflexion, retroflexion, sinistroflexion, and dextroflexion (*v.* Figs. 17, 18). It is not necessary that both flexion and version should occur in the same direction. As will be seen in the diagram, a uterus may be retroverted and anteflexed, or *vice-versâ,* or it may be dextroverted and sinistroflexed, or *vice versâ* (*v.* Figs. 17, 5, and 18, 5, 6). In such complex displacements, the flexion is considered to be the more important, and in whatever direction it takes place, the uterus is said to be displaced.

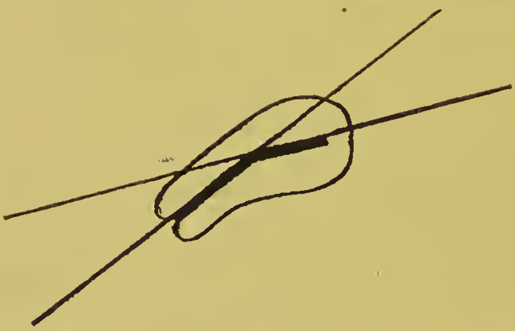


FIG. 14.—Diagram of the uterus showing the axes of the body and cervix.

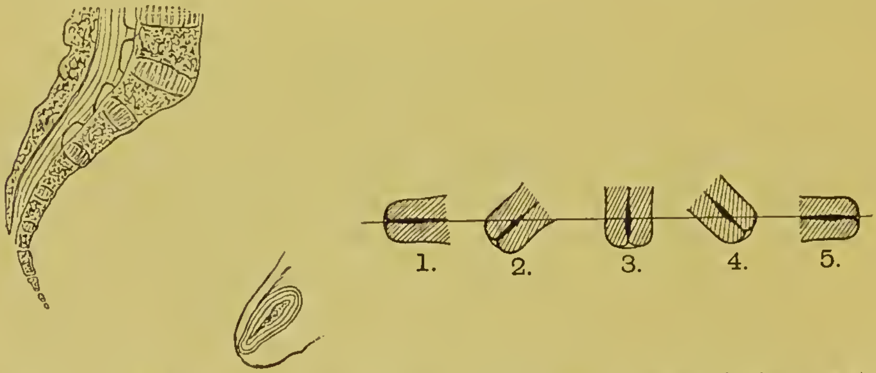


FIG. 15.—Diagram showing the different versions of the cervix in an antero-posterior plane. 1. Complete anteversion. 2. Slight anteversion. 3. Vertical position. 4. Slight retroversion. 5. Complete retroversion.

Two main variations from the ordinary definitions have been made in defining these terms. In the first place, the movements of the cervix are said to govern version. If any of the classical diagrams of uterine displacements are examined, it will be seen that this is the case, and that the definition given above is more correct than is the commonly accepted definition of version—a "rotation of the whole uterus round a transverse axis, *without the position of the cervix and body relative to one another being altered.*" In the next place, a version is considered as a turning away from the vertical, either forwards, backwards, or laterally, and not as a turning away

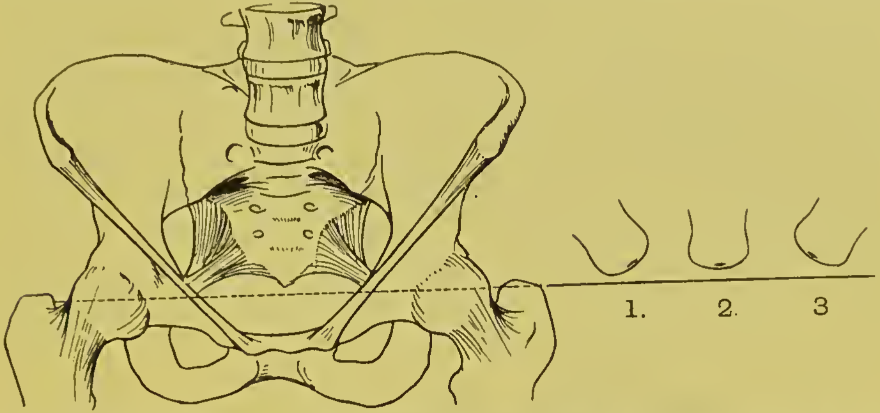


FIG. 16.—Diagram showing the different versions of the cervix in a lateral plane. 1. Dextroversion. 2. Vertical position. 3. Sinistroversion.

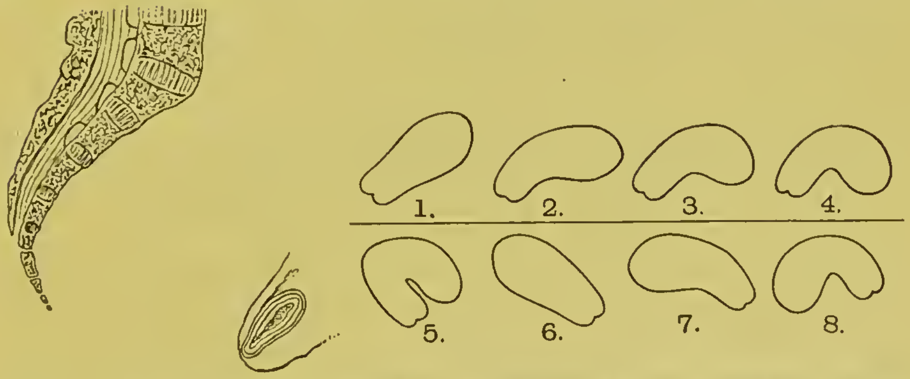


FIG. 17.—Diagram showing the different positions of the uterus in an antero-posterior plane. 1. Anteversion. 2, 3. Anteversion and slight anteflexion. 4. Anteversion and marked anteflexion. 5. Retroversion and marked anteflexion. 6. Retroversion. 7. Retroversion and slight retroflexion. 8. Retroversion and marked retroflexion.

from the axis of the pelvic brim as it is more frequently said to be.

The following paragraphs state briefly the terms applied to the various positions which the uterus may assume so far as flexions and versions are concerned, and may be of assistance in enabling the student to more clearly understand these somewhat puzzling terms.

(1) When the axes of the body and of the cervix of the uterus coincide and are vertical, the uterus may be regarded as being neither in a position of version nor of flexion.

(2) When the axes of the body and cervix of the uterus coincide, but are inclined away from the vertical, the uterus is said to be ante- retro- or latero-verted according to the direction in which the coincident axes are inclined. As the axes coincide, flexion is absent (*v.* Fig. 17, **1**, **6**).

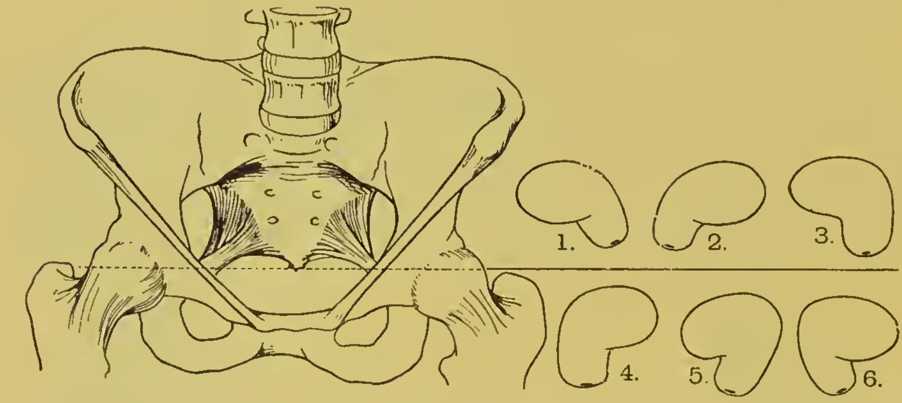


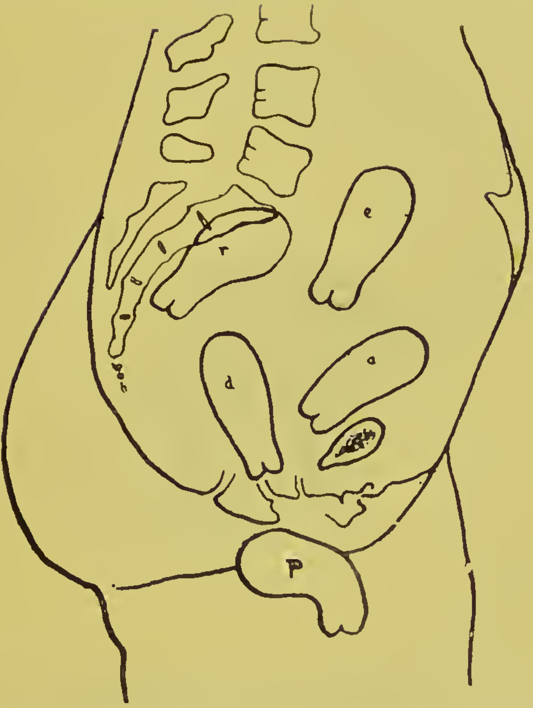
Fig. 18.—Diagram showing the different positions of the uterus in a lateral plane. 1. Dextroversion and dextroflexion. 2. Sinistroversion and sinistroflexion. 3. Dextroflexion alone. 4. Sinistroflexion alone. 5. Sinistroversion and dextroflexion. 6. Dextroversion and sinistroflexion.

(3) When the axis of the cervix is vertical and the axis of the body does not coincide with it, the uterus is said to be ante- retro- or latero-flexed according to the direction in which the axis of the body is inclined. As the axis of the cervix is vertical, version is absent (*v.* Fig. 18, **3**, **4**).

(4) When the axis of the cervix is inclined away from the vertical and the axes of the body and cervix do not coincide, the uterus is said to be ante- retro- or latero-flexed and -verted according to the direction in which both axes are respectively inclined (*v.* Figs. 17, **2**, **3**, **4**, **7**, **8**, and 18, **1**, **2**).

If the uterus is displaced *en bloc* in any direction in a horizontal plane, it is spoken of as *-posed*, with the addition of whatever prefix expresses the direction in which it has been displaced,—anteposed, retroposed, dextroposed, sinistroposed (*v.* Figs. 19, *a*, *r*, and 28).

If the uterus is displaced in a vertical direction, it is spoken of as *ascent* when it is displaced upwards, *descent* when it is displaced downwards (*v.* Fig. 19, *e*, *d*). There are two degrees of the latter. Descent of the uterus is known as *prolapse* so long as the uterus does not leave the vagina, it is known as *procidentia* when the uterus has done so and is protruding from the vulva (*v.* Fig. 90).



IG. 19.—Diagram representing some uterine displacements. *e.* Ascent. *a.* Anteposition. *d.* Prolapse. *r.* Retroposition. P. Procidentia. (*Schultze*).

Before commencing to study the abnormal positions of the uterus, it is necessary to understand clearly what is the normal position of this organ. If we understand that the uterus is a mobile organ, and that all its positions—normal or abnormal—are the result of the forces—physiological or pathological as the case may be—that act upon it, and if we discover what the physiological forces are, there will not be any difficulty in determining what are, and what are not, the normal positions of the uterus.

First, what is the normal degree of mobility of the uterus? The relations of the uterus are such that it is enabled to rotate in a sagittal mesial plane following the arc of a circle whose centre is situated about the cervico-vaginal junction. At the same time, the consistency of the fibres of the uterine isthmus is such that the body can bend under the influence of any slight force—such as its own weight—in such a manner that its axis, instead of coinciding with that of the cervix, is inclined to the latter at a varying angle (*v.* Fig. 20).

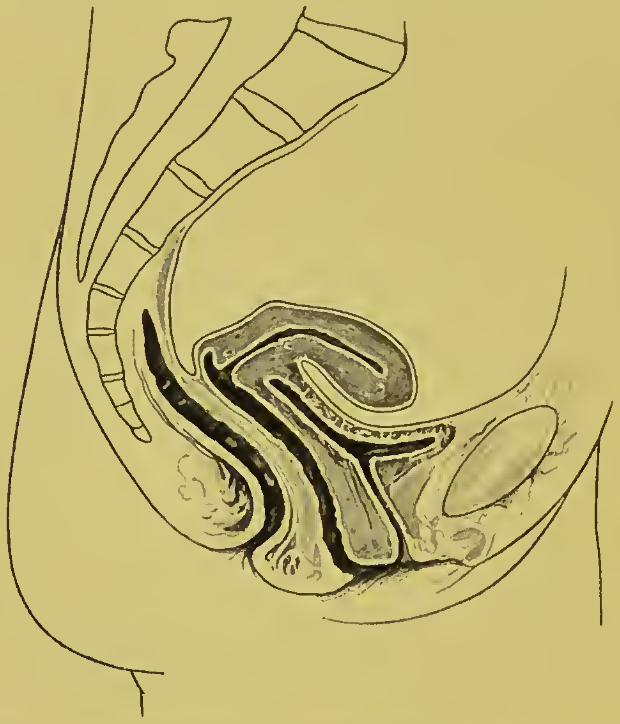


Fig. 20.—Diagram representing the normal position of the uterus in virgins.

Secondly, what are the physiological forces which act upon the uterus? The forces which unite to keep the uterus in its normal position are:—

(1) The strain exerted by the uterine ligaments.
(2) The weight of the uterine body.
(3) The intra-abdominal pressure.
(4) The resistance of the pelvic floor and bladder.

(1) *The Strain exerted by the Uterine Ligaments.*—The pos-

terior or utero-sacral ligaments contain muscle-fibres, and run from the lateral aspect of the supra-vaginal portion of the cervix to the sides of the second sacral vertebra. When they contract they pull the cervix backwards, and so tend to keep the centre of gravity of the body in front of the cervix, and the uterus in a position of anteversion. The round ligaments also contain muscle-fibres, and the effect of their contractions is to pull the fundus forwards. The broad ligaments keep the uterus moored in a sagittal mesial plane.

(2) *The Weight of the Uterus.*—The weight of the uterus acting under the influence of gravity, in conjunction with the flexile nature of the isthmus and with the action of the ligaments, results in producing a slight degree of forward flexion of the body, and marked forward version of the cervix. The flexile nature of the isthmus is greater before pregnancy than after it, and as a result there is a correspondingly greater degree of anteflexion—when the bladder is empty—in virgins than in parous women (*v.* Fig. 20).

(3) *The Intra-abdominal Pressure.*—The intra-abdominal pressure, acting on the uppermost surface of the uterus, tends to drive the latter more deeply into the pelvis.

(4) *The Resistance of the Pelvic Floor, etc.*—The resistance of the pelvic floor and bladder is a force, acting upwards, which is sometimes in equilibrium with the downward intra-abdominal pressure. At other times, *i. e.* when the bladder is distending or emptying, it is temporarily either greater or less than the intra-abdominal pressure, and so causes a diminution or an increase in the degree of flexion and version present. If the distension of the bladder is very marked, the uterus may be pushed into a vertical position, or even a slight degree of retroversion may occur. If the rectum is also distended, the resistance of the pelvic floor may be so increased that the uterus is pushed upwards—ascent (*v.* Fig. 22).

The physiological result of all these forces is that the uterus lies in a sagittal mesial plane, its anterior surface in approximation with the bladder, and the tip of the cervix on a level with the lines joining the ischiatic spines. When the bladder is empty, the cervical axis is almost horizontal, with the fundus in front—markedly anteverted, and the axis of the body is inclined slightly in front of the cervical axis—anteflexed, so that the fundus rests upon the empty bladder (*v.* Figs. 20 and 21). When, on the other hand, the bladder is full, the uterus will be found in an almost vertical position, or, if the former is over-distended, the cervical axis may be even inclined backwards—retroverted.

Accordingly, it is seen that there is no one normal position of the uterus, but rather that the latter possesses a constantly changing range of positions, owing to frequent alterations in the resistance of the pelvic floor and bladder. So long as the uterus returns to the position it normally occupies when the bladder is empty, as soon as that event occurs, none of these positions can be considered as displacements—pathologically speaking. The moment, on the other hand, any position becomes stable to such a degree that the uterus cannot return to the position it normally occupies when the bladder is empty, or leave that position as the bladder fills, so soon does a pathological displacement or malposition exist.

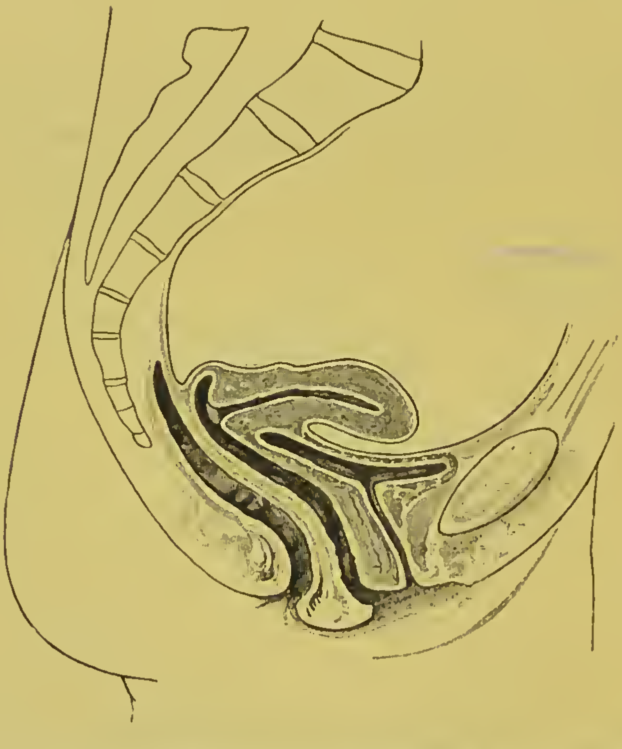


Fig. 21.—Diagram representing the normal position of the uterus in women who have borne children.

Speaking in general terms the causes of malposition are to be found in any factors which tend to :—

(1) Diminish, or increase the normal flexibility or mobility of the uterus.

(2) Diminish, increase, or change the direction of the various normal forces which act upon the uterus.

(3) Bring into play other forces which normally are not in existence.

The specific causes, which bring about the various abnormal positions, will be discussed in their proper place.

The following table shows the various displacements which are met with :—

Upward displacement	Ascent.
Downward displacement	Prolapse. Procidentia.
Backward displacement	Retro-version, or -flexion, or both. Retroposition.
Forward displacement	Ante-version, or -flexion. Anteposition
Lateral displacement	Dextro- or sinistro-version or -flexion. Dextro- or sinistro-position.
Torsion	Dextro- or sinistro-torsion.
Inversion	Incomplete. Complete.

UPWARD DISPLACEMENT.

Ascensus or *Elevatio Uteri* is the term applied to the position of the uterus when it lies at a higher level than normal in the abdominal cavity (*v.* Fig. 22.)

Ætiology.—Ascent of the uterus may be brought about by :—

(1) Tumours developing below the uterus in such a position as to gradually push it upwards.

(2) Adhesions forming between the uterus and some of the abdominal viscera or parietes.

(3) The operation known as ventral hysteropexy (*v.* page 373).

Symptoms.—It is improbable that *ascensus uteri* causes any noticeable symptoms, unless it occurs to an unusually marked degree. Any symptoms, which may be present, will be usually found to be due to the condition which is giving rise to the elevation of the uterus.

Treatment.—As a rule, it is the cause of the displacement which must be treated, and not the displacement itself. If the condition is due to the presence of a tumour, it will be cured by removing the latter. The presence of peritoneal bands will rarely call for any interference on account of this effect upon the uterus.

DOWNWARD DISPLACEMENTS.

As has been stated already, *prolapse* and *procidentia* are only different degrees of the same condition, *i. e. descensus uteri.* In prolapse, none of the uterus has passed the vulvar orifice, while in procidentia, a part or the whole of it has done so (*v.* Figs. 23 and 90).

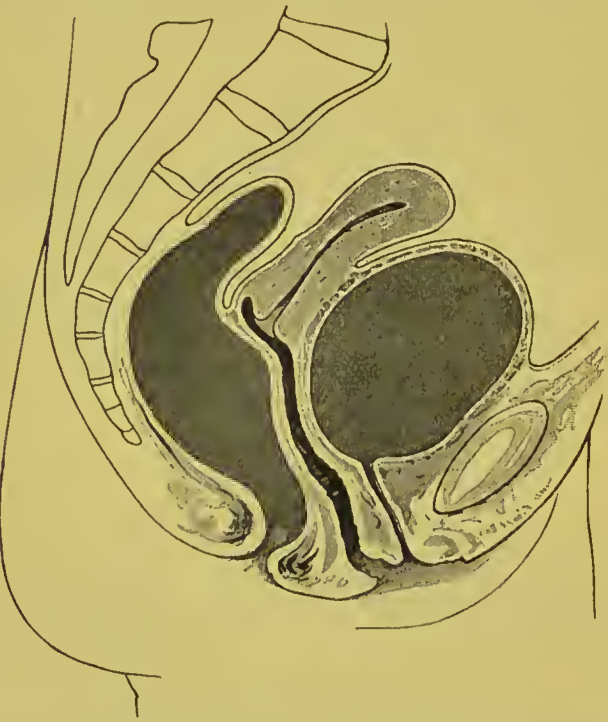


FIG. 22.—Physiological ascensus uteri, due to distension of bladder and rectum.

Ætiology.—The factors which keep the uterus at its normal level in the pelvic cavity, *i. e.* with the tip of the cervix on a level with the line joining the spines of the ischia, are :—

(1) The intra-abdeminal pressure.
(2) The resistance of the pelvic floor.

The causes of prolapse of the uterus will be found in something which interferes with the normal condition of equilibrium which exists between these two factors. In other words, descent of the uterus usually occurs as the result of increased intra-abdominal pressure, or of diminished resistance of the pelvic floor, or of the two occurring in conjunction. Increased intra-abdominal pressure may be brought about by the presence of tumours, ascites, constant straining, etc. Diminished resistance of the pelvic floor is almost always caused by lacerations occurring during parturition, especially when they involve the levator ani muscle; also by the relaxation of the vaginal walls and vulva brought about by frequent childbirth. The manner in which lacerations tend to cause descent of the uterus, will be discussed in the chapter on genital traumatisms (*v.* page 205).

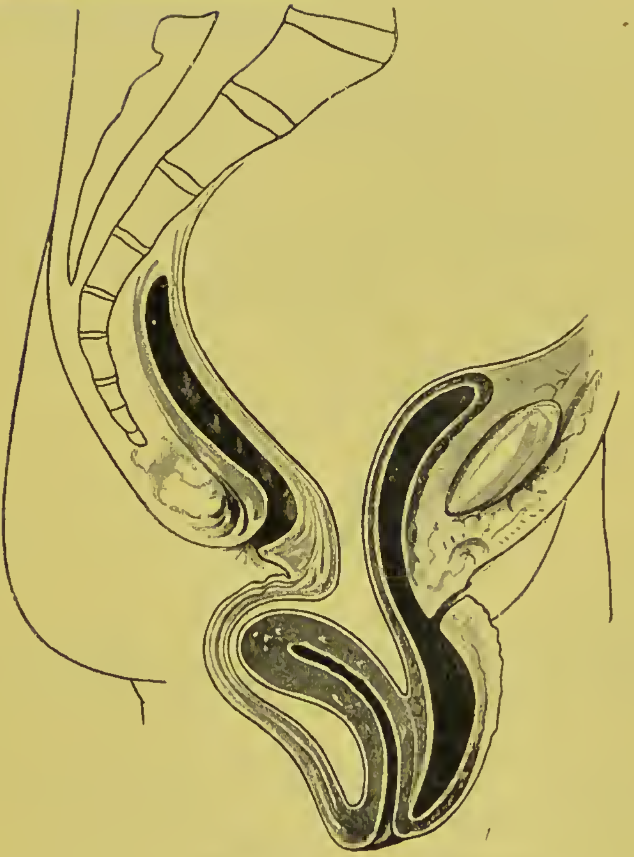


Fig. 23.—Diagram representing complete prolapse (procidentia) of the uterus.

There is one form of uterine descent to which these remarks do not apply, viz. to that form which is known as congenital prolapse. This condition is due to a congenital laxity of the uterine ligaments, and is found associated with laxity of the ligaments which hold the abdominal viscera in place. Thus, with congenital descent of the uterus, we frequently find associated floating kidney and liver.

Pathological Anatomy.—On examination, the uterus is found either at a lower level than normal in the vagina, or in part or altogether outside the vulva. As a rule, the entire length of the uterus is increased, and this increase is found to be due to an elongation of some part of the cervix. According to Schroeder, the cervix is divisible into three zones or portions:—a lower zone—the infra-vaginal portion, which comprises the part of the cervix lying below the attachment of the anterior vaginal wall; an intermediate zone or portion, lying between the attachments of the anterior vaginal wall and the posterior vaginal wall; and an upper zone or supra-vaginal portion lying above the attachment of the posterior vaginal wall (*v.* Fig. 24). Most usually, it is the supra-vaginal portion of the cervix which is hypertrophied.

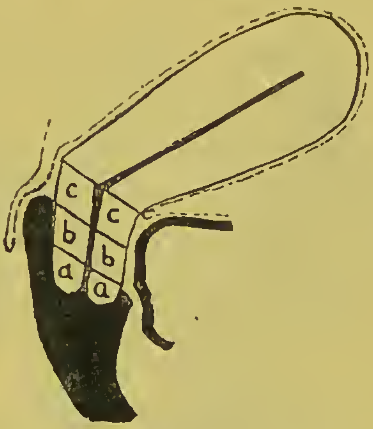


Fig. 24.—Diagram of the three zones of the uterine neck (*Schroeder*). *a a.* Infra-vaginal zone. *b b.* Intermediate zone. *c c.* Supra-vaginal zone.

If the cervix has passed the vulvar orifice, a certain amount of inversion of the vaginal walls will be present. As the uterus comes to lie at a still lower level, this inversion becomes more and more marked, until finally the vaginal fornices are completely obliterated. As a result of this inversion, the mucous membrane of the vagina, from constant friction against the thighs and from interference with its blood-supply, becomes dry, is thickened, and more or less resembles ordinary epidermis. There is usually some ulceration of the mucous membrane of the cervix (*v.* Fig. 90), a condition, which, if the procidentia has been present for some time, extends more or less over the entire inverted vagina. The bladder is brought down in company with the anterior vaginal wall, causing the condition known as cystocele. The rectum may also, but to a much less extent, be dragged down with the posterior vaginal wall, causing the condition known as rectocele.

Symptoms.—The symptoms of prolapse of the uterus are not very well marked, they are more definite in the case of procidentia. Either condition causes, according to its degree, a sense of weight and dragging in the pelvis, pain running upwards towards the kidneys, frequent and difficult micturition or perhaps even retention of urine, constipation, and various reflex troubles —vomiting, epigastric pain, and dyspepsia. There are also the symptoms caused by the endometritis, which very frequently accompanies descent.

Treatment.—The treatment of descent falls under two heads:—

(A) Palliative treatment.
(B) Radical treatment.

(A) **Palliative Treatment.**—Palliative treatment consists in replacing the prolapsed uterus, and maintaining it in its position by means of a suitable pessary. The reposition of the uterus is generally easily accomplished if the vaginal walls are not excessively œdematous, as sometimes happens. With the patient in the dorsal position, the parts having been well washed, the mass protruding outside the vulva is taken in the hand and pushed gently upwards. Care must be taken to press in such a manner that the vulvar end of the vaginal canal is pushed back first. As soon as the entire mass is reduced, a bimanual examination must be made to determine if there is any retro-deviation of the uterus. If there is it must be rectified. The means, by which the uterus is kept in position, depend upon whether the vaginal walls and cervix are free from ulceration and œdema or not. If they are healthy, a suitable pessary may be inserted at once, but if they are unhealthy, they must be restored to a normal condition before doing so. The first step is to cleanse the ulcer thoroughly, and to cauterise it by the momentary application of strong carbolic acid on a piece of cotton wool. Subsequently, daily vaginal douches should be administered, followed by the application of a vaginal tampon of cotton wool soaked in a ten per cent. solution of ichthyol in glycerine, or a mixture of Tr. Benzoin Co. and glycerine of a strength of a drachm to the ounce. If the patient has to attend to herself, the tampon is tied round with a piece of tape, which hangs outside the vulva, and by pulling on which the plug can be easily removed. As soon as all ulceration of the vaginal mucous membrane is cured a pessary may be inserted.

There are a few general rules which apply to the mode of using any form of pessary, not alone in cases of prolapse, but in any displacement in which the use of a pessary is necessary:—

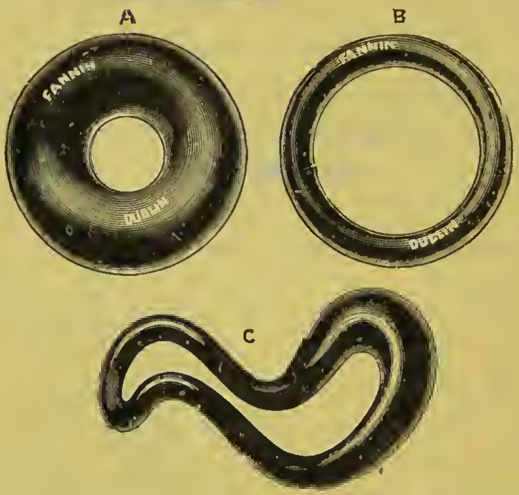


Fig. 25.—Pessaries. A. Hollow vulcanite ring. B. Solid ring of Vulcanite or celluloid, representing the first stage in the manufacture of a Hodge pessary. C. Thomas' modification of a Hodge pessary.

(1) The pessary must not be inserted if the mucous membrane of the vagina is unhealthy.

(2) It must be possible to pass the tip of the finger round the pessary when *in situ*, between it and the vaginal wall.

(3) Ordinary straining on the part of the patient must not displace the pessary downwards.

(4) The pessary must not cause any pain.

(5) The pessary must correct the displacement for which it is inserted, otherwise it is of no use; and it must be the smallest pessary which will do this.

(6) The pessary must not be allowed to remain *in situ* for more than three months at a time.

There are four forms of pessary which can be used in these cases :—

(1) A solid vulcanite ring (*v.* Fig. 25, B).
(2) A flexible rubber ring, either solid—Meyer's ring, or containing a watch-spring inside (*v.* Fig. 26).

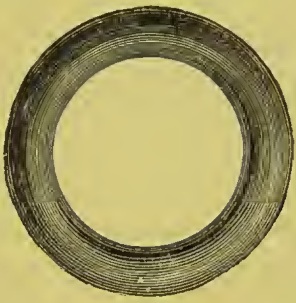


Fig. 26.—Meyer's solid rubber ring.

(3) A hollow vulcanite ring (*v.* Fig. 25, A).
(4) A Hodge, or Smith-Hodge, pessary, as used for retrodeviations (*v.* Fig. 27).

The solid vulcanite ring is the initial stage in the manufacture of the Smith-Hodge pessary. It is made in sizes varying from one and a half inches to four inches in diameter. It is easily inserted, as all that has to be done is to pass it into the vagina after the uterus has been placed in its normal position. It is specially useful when the uterus is atrophied, as in such cases it is not of much importance whether the latter is kept in a position of anteversion, as well as being kept at its proper level, or not.

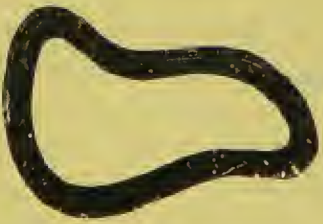


Fig. 27.—Smith-Hodge vulcanite or celluloid pessary.

The flexible rubber or watch-spring pessary is of use in cases where the vagina is very capacious but the vulvar orifice not very much enlarged, as in such it can be more easily introduced than can a rigid pessary. If the uterus is brought into a position of anteversion before inserting the pessary, as should always be done, a rubber ring will frequently keep it so. The disadvantage of this pessary is that it is difficult to keep clean and that the rubber tends to become disorganised.

The rigid hollow vulcanite ring is most useful in cases in which a solid vulcanite ring cannot be retained. It is a most comfortable form of pessary, as its large surface does not tend to press to an appreciable extent on any part in particular of the vaginal wall. If it is used, the patient must be warned that it requires to be taken out tolerably frequently, especially in old people. It is frequently inserted at an age at which the genitals are commencing to shrink, and, if left in too long, it may become incarcerated owing to the contraction of the vulvar orifice, with the result that it is impossible to remove it without breaking it up. It also tends to set up vaginitis by preventing the escape of discharge.

A Hodge pessary, or that modification of it known as a Smith-Hodge, is best suited for those cases in which it is essential for the success of the treatment that the uterus should be kept in a position of anteversion, and in which the perinæum and the levator ani muscle are sufficiently intact to maintain the pessary *in situ*. The manner of inserting it will be described when discussing its use in backward displacements. Occasionally, it will not remain in position when inserted in the ordinary manner, but will do so if inserted so that the broad end lies lowest.

As well as inserting a properly fitting pessary, the patient must be told to avoid as far as possible all forms of violent straining. With this object, the bowels must be kept regular, any bronchial or laryngeal condition which causes coughing must, if possible, be cured, and occupations which tend to cause sudden or prolonged increase of the intra-abdominal pressure must be avoided.

(B) **Radical Treatment.**—With the modern advance of gynæcological surgery, the radical treatment of descent of the uterus is becoming every day a more generally accepted procedure, and it is becoming more widely recognised that palliative treatment by means of pessaries is unsound in principle and practice, and should be confined to cases in which circumstances prevent the adoption of operative measures. Palliative measures rarely or never effect a cure, but rather tend, each year they are continued, to leave the patient in a worse condition. The large pessaries, which must be inserted where there is much relaxation of the vulvar orifice, increase the distension of the vagina, and to make up for this a still larger pessary has to be introduced from time to time. The presence of such pessaries maintains a congestion of the parts, and prevents the involution of a large uterus. The longer palliative measures are continued, the more difficult it is to subsequently adopt radical measures successfully. If perinæal lacerations were sutured at the time of their occurrence, or if chronic lacerations were sutured before descent of the vagina took place, prolapse of the vagina would be a thing of the past. Radical measures, if properly carried out, in cases in which all the normal elasticity of the ligaments has not been destroyed, are as a rule successful, and keep the uterus in a proper position without the use of pessaries. Even when the alteration in the tissues is so great as to prevent a complete cure from being obtained, they are still of value, as by restoring the perinæal body and by reducing the size of the uterus, they enable the latter to be kept in position by a small pessary. In the present state of surgery, it is as foolish to allow a patient to continue with a large prolapse of the uterus as with a large hernia. The actual danger to life may not be so great in the former, as in the latter condition, but the associated discomfort and ill-health are perhaps greater.

The radical treatment of descent of the uterus is directed to the removal or cure of those pathological conditions which have given rise to the descent. Accordingly, all measures of operative interference will fall under one or other of the following heads :—

(1) Measures directed towards the strengthening of the pelvic floor.

(2) Measures directed towards the reduction of excessive intra-abdominal pressure, or of increased size and weight of the uterus.

(3) Measures directed towards the fixing of the uterus in a normal position.

(4) The removal of the uterus.

(1) Operations directed towards the strengthening of the pelvic floor should, theoretically, be directed towards the repair of the levator ani muscle; practically, we are rarely able to take

any very effective steps in this direction, and are obliged to limit our interference to the removal of the excessive vaginal mucous membrane and the restoration of the perinæal body. This procedure gives in most cases very satisfactory results, if it is combined with the necessary measures for keeping the uterus in its proper position. If, however, the patient should again become pregnant and give birth to a full-time child, the consequent over-distension of the mucous membrane may cause a return of the condition of vaginal prolapse.

According to the state of affairs, the operations necessary will be :—

(a) Anterior colporrhaphy (v. page 305).
(b) Posterior colporrhaphy (v. page 283).
- Perinaeorrhaphy (c) Perinæorrhaphy (v. page 283).

The two last operations may be replaced by one known as colpo-perinæorrhaphy, as if posterior colporrhaphy is performed it should in almost all cases be supplemented by perinæorrhaphy. In this case the best combined operation is either Hegar's or Martin's. If a perinæorrhaphy alone is performed, Lawson Tait's is the best operation when there is any actual loss of tissue, but, when there is an excess of tissue, Hegar's operation is perhaps preferable.

(2) Measures directed towards the reduction of excessive intra-abdominal pressure, include the removal where possible of tumours which may be pressing downwards into the pelvis, and the treatment of the various forms of ascites.

Measures directed towards the reduction of excessive size or weight of the uterus, include the removal of uterine myomata or of a hypertrophied cervix, and the cure of any other cause of uterine enlargement—as metritis and endometritis. Amputation of the cervix is beneficial not only in cases where the cervix is very much hypertrophied, but also as a means of bringing about involution in a large uterus. The most simple and easily performed operation is that described by Simon Marckwald (v. page 313). Curetting is another and most valuable means of bringing about involution, and should be the invariable prelude to any operation for the cure of uterine prolapse.

(3) Measures directed towards the fixing of the uterus in a normal position include :—

(a) Vaginal hysteropexy (v. page 376).

(*b*) Ventral hysteropexy (*v.* page 373).

(*c*) Shortening of the round ligaments (*v.* page 392).

(*a*) Vaginal hysteropexy, or anterior vaginal fixation, is the term applied to that operation by which the body of the uterus is brought down between the cervix and the bladder and sutured to the anterior vaginal wall. It is most easily accomplished by the operation introduced by Mackenrodt—an operation which can, in many cases, be beneficially and easily combined with anterior colporrhaphy.

(*b*) Ventral hysteropexy, is the term applied to the proceeding by which the uterus is fixed, in a position of anteversion, to the anterior abdominal wall in the middle line. It is most suitable for those cases in which the descent of the uterus is brought about by an undue laxity of its ligaments, rather than by a diminution in the resistance of the pelvic floor. It will give good results in these latter cases also, but is a more serious operation than vaginal fixation.

(*c*) Shortening of the round ligaments does not offer any particular advantages in descent of the uterus. It undoubtedly will keep the latter in a position of anteversion, but without suspending it in the same manner that abdominal hysteropexy does; whilst if a colporrhaphy has to be done, vaginal fixation is more easily carried out.

(4) Removal of the uterus is recommended under certain circumstances. Vaginal hysterectomy is the method chosen, and the operation is easy owing to the low situation of the uterus. It is usually necessary to combine with it a plastic operation on the perinæum and vaginal walls, as otherwise the vaginal prolapse would persist. This line of treatment is but rarely necessary, but is sometimes a suitable procedure if the patient has passed the menopause, especially in cases in which the uterus is enlarged by myomata or chronic metritis.

Although in discussing the operative treatment of prolapse the different proceedings have been considered under four heads, it must not be thought that in treating any case we adopt one of these particular lines of treatment to the exclusion of the others. If the case is one of procidentia, in which the uterus is of sufficient size to render it necessary that it should lie in its normal position, the procedure which the author prefers is that recommended by Martin (of Berlin), viz.:—

(1) Curetting.
(2) Anterior colporrhaphy, and vaginal fixation of the uterus.
(3) Amputation of the cervix.
(4) Colpo-perinæorrhaphy.

In every case the general rule must be followed of first ascertaining the specific causes of the prolapse, and then adopting those measures which offer the best prospect of removing them.

Quite recently, Stephen Paget suggested a new method of dealing with cases of prolapse in old women in whom a pessary does not keep the uterus in a proper position, and who are too feeble to stand a prolonged plastic operation of the nature of those which have been just described. This method consists in the submucous injection of paraffin, in a manner similar to that adopted with the object of improving nasal deformity. From one to two ounces of a paraffin with a melting point of 108° F., are injected beneath the mucous membrane of the posterior and lateral vaginal walls and the posterior part of the vaginal portion of the cervix. Doubtless, it would be well to also inject some beneath the anterior vaginal wall in cases of cystocele, if it was possible to do so safely, but Paget does not consider it advisable to bring the paraffin into the neighbourhood of the bladder or urethra. We have had no experience of such a method of treating prolapse, and hence cannot express an opinion either for or against it, but it appears to us that such a procedure should be feasible. In Paget's hands, it has afforded good results.

BACKWARD DISPLACEMENTS.

Backward displacements of the uterus include retroversion, retroflexion, and retroposition, or any combination of these. As has been mentioned, slight degrees of these displacements may occur physiologically as the bladder is distending, but in order to constitute a pathological condition they must have a tendency to become permanent.

RETROVERSIONS AND FLEXIONS.—Retroversion and retroflexion are generally associated for the same reason that anteversion and anteflexion are associated when the uterus is normal in position. That is to say, if the uterus is either anteverted or retroverted the weight of the uterine body causes the body to flex until the fundus rests on the surface immediately below it (*v.* Figs. 20, 21, and 28). Thus, when the uterus is turned backwards—retroverted—the fundus falls to the bottom of Douglas pouch, and so a retroflexion is produced in addition.

In rare cases, the uterus may be retroverted alone (*v.* Fig. 29). This is only possible under the following conditions:—

(1) If the fundus is held by adhesions in such a manner as to prevent it from falling to the bottom of Douglas' pouch.

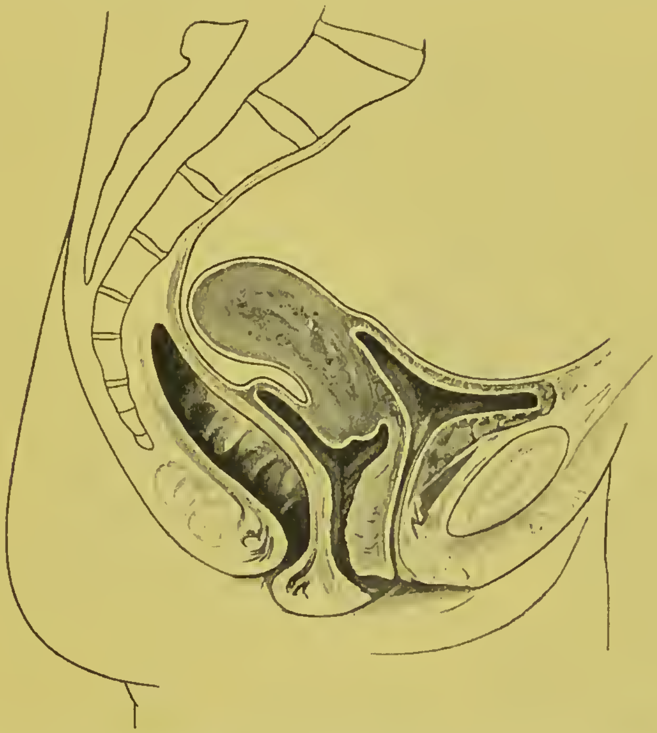


FIG. 28.—Diagram representing a combined retroversion and retroflexion—retroversio-flexio.

(2) If the uterine tissue has become so rigid from disease that the isthmus has lost its normal flexibility (*v.* page 64).

(3) If Douglas' pouch is occupied by a tumour or other mass which prevents the retroflexion of the fundus.

(4) If the uterus is retroposed to such a degree that the body is supported by the sacrum.

It may be taken as a general rule that, though a combined retroversion and flexion (*retroversio-flexio*) is apparently a greater degree of displacement than a retroversion alone, the latter is a proof of the presence of a more marked degree of uterine or pelvic trouble than is the former.

Ætiology.—The factors which keep the uterus in its normal position of complete anteversion and slight anteflexion are:—

(1) The utero-sacral ligaments, which draw the cervix backwards, and so keep the centre of gravity of the fundus in front of the cervix.

(2) The round ligaments, which tend to pull the fundus forwards.

(3) The intra-abdominal pressure, which keeps the fundus in apposition with the bladder so long as the utero-sacral ligaments are doing their work.

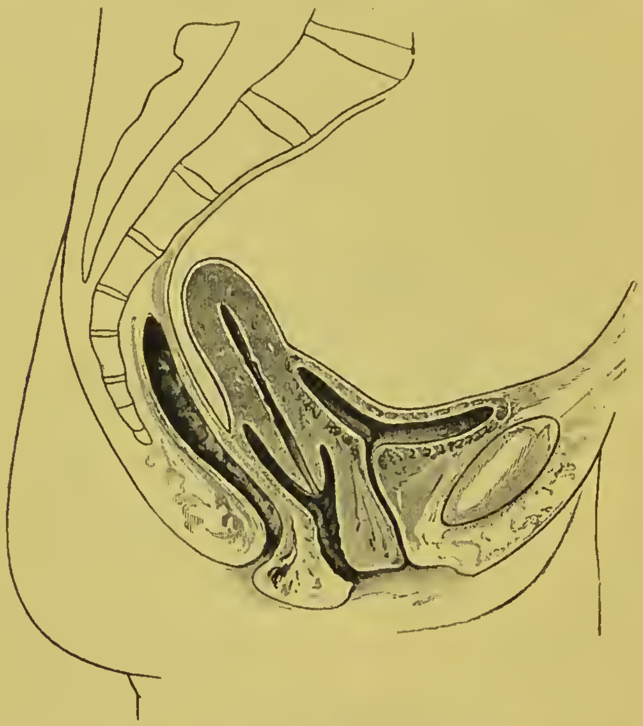


Fig. 29.—Diagram representing a retroverted uterus.

The commonest cause, speaking in general terms, of *retroversio-flexio* is relaxation of the ligaments associated with increase in size of the uterine body. As a result of the increased size, the fundus tends to fall backwards when the bladder becomes distended, and as a result of the laxity of the ligaments, there is no opposing force to prevent it from doing so. Consequently, the body falls away from the bladder, and then the intra-

abdominal pressure acts upon the anterior instead of the posterior uterine wall, and so tends to drive the fundus to the bottom of Douglas' pouch. Rarer causes are to be found in the adhesions and bands which are the result of peritonitis and ii
parametritis, in the traction caused by enlargements of the iii
adnexa, and in the pressure exerted by neighbouring tumours. iv

The specific causes of backward displacement of the uterus are the following:—

(1) Chronic metritis.
(2) Subinvolution.
(3) Small tumours of the uterus.
(4) Congenital laxity of the ligaments.
(5) Congenital mal-development of the uterus.
(6) Pelvic peritonitis.
(7) Cicatricial bands drawing the cervix forwards, the result of anterior parametritis.
(8) Enlargements of the tubes or ovaries.
(9) Habitual over-distension of the bladder and rectum.

Symptoms.—The symptoms caused by backward displacements of the uterus are in the main due to the endometritis by which the condition is almost invariably accompanied; to pressure exerted by the retro-deviated uterus upon the sacral nerves and the rectum; and, more rarely, to traction upon, or pressure against, the base of the bladder, and to an accompanying prolapse of the ovaries. As a result, the patient suffers to a very variable extent from menorrhagia and perhaps metrorrhagia, leucorrhœal discharges, dysmenorrhœa, pain in the lumbar or ovarian region, perhaps constipation and rectal tenesmus, and, still more rarely, dysuria. If the ovaries are prolapsed below the uterus, dyspareunia may also result. Sterility, or, if the patient becomes pregnant, abortion, is a common occurrence.

Diagnosis.—The diagnosis of a retro-deviation of the uterus is made by means of a bimanual examination, carried out in the ordinary manner. If, owing to the excessive stoutness of the patient, the rigidity of the abdominal walls, or the presence of tumours, it is impossible to determine the position of the uterus in this manner, it will be necessary to resort to the uterine sound. Too much prominence has been given to the use of this instrument, both as a means of diagnosing and as a means of correcting displacements of the uterus. The sound should only be used for either of these purposes when the bimanual methods of examination and of reposition have failed; and it must not be used even then unless due precautions have been taken to ensure that it shall not be a means of introducing septic matter into the uterus. In order to determine the position of the uterus by this means, the sound is passed gently into the cavity, allowing it to take its own course. The direction in which the point of the sound travels is noted, and also the direction in which the concavity of the sound looks when the latter is in the uterus. In this way we can determine, first, whether the fundus is in front of or behind the cervix, and, secondly, the direction of flexion of the uterine body.

Treatment.—The treatment of *retroversio-flexio,* as of descent, falls under two heads:—

(A) Palliative treatment.
(B) Radical treatment.

As a general rule, it is advisable to adopt one of these two lines of treatment in all cases in which a retro-deviation of the uterus is met with. Even if the displacement is not at the moment giving rise to any symptoms, it will most probably do so in the future, and the longer it is allowed to persist the more difficult will become the necessary remedial treatment. Perhaps the only instance in which this rule does not hold good, is when a backward displacement is met with in association with a senile atrophic uterus after the menopause. In carrying out either palliative or radical treatment there are two objects to be aimed at:—the maintenance of the uterus in a normal position, and the cure of the accompanying endometritis.

(A) **Palliative Treatment.**—The palliative treatment of retro-deviations consists in replacing the uterus, in keeping it in position by means of a suitable pessary, and at the same time in treating the accompanying endometritis by local applications to the endometrium (*v.* page 117). It is the mode of treatment most usually adopted in these cases, and although it does not effect a permanent cure in all of them, in some it does do so, and hence should be given a trial whenever possible. It is most likely to yield good results in cases in which the displacement is due to subinvolution or endometritis, and where by curing these conditions we bring about a diminution in the size of the uterus.

1. The reposition of the uterus is a proceeding which in the

large majority of cases is quite simple, but which may be attended with any degree of difficulty up to absolute impossibility. Difficulties are caused by rigidity or excessive fatness of the abdominal wall, by the presence of adhesions, by the impaction of the uterus in the pelvic cavity, and by the pain to which attempts at reposition sometimes gives rise.

Reposition should whenever possible be carried out bimanually, and the use of the sound should be avoided unless an accurate diagnosis of the state of affairs present has been made. If there are adhesions holding down the uterus, or if for any reason the uterus does not respond readily to the pressure of the sound, the latter may easily perforate its walls. In many cases, we can replace a uterus bimanually which we could not replace with the sound, and perhaps the only instance in which we can succeed with the sound where the hands have failed, is when the abdominal wall is very rigid or very fat.

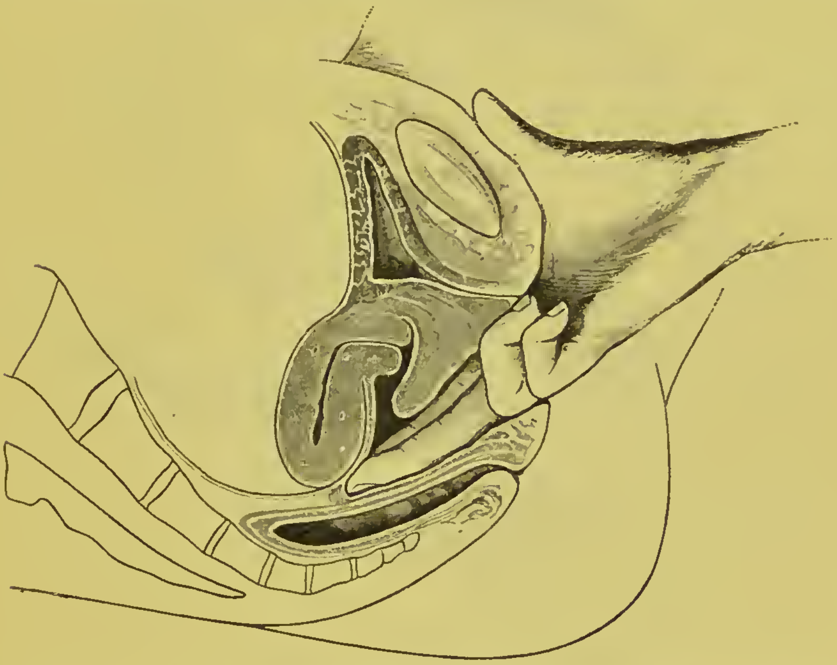


FIG. 30.—Diagram representing the first stage in the manual reposition of a retroversio-flexio uteri.

The steps in the reposition of a uterus which is not bound down by adhesions, will be most easily understood by reference to the accompanying diagrams. With the patient in the dorsal position, the first step consists in introducing one finger of the right or left hand, as the operator chooses, into the vagina, the other hand lying on the abdominal wall, as if a bimanual examination was being made (*v.* Fig. 2). The fundus of the uterus is felt with the vaginal finger passed into the posterior fornix, and pressure is made upon it in such a direction as to cause it to rise upwards towards the pelvic brim (*v.* Fig. 30). This pressure is continued until the fundus is pushed up as far as the length of the finger will allow (*v.* Fig. 31). Then the finger is moved from the posterior fornix to the anterior, and backward pressure is made upon the cervix. This pushes the cervix backwards beneath the fundus, and so enables us to push the latter higher out of the pelvis, by adding to the length of the vaginal finger the thickness of the cervix (*v.* Fig. 32). By this time, the fundus has been brought within reach of the external hand—which up to this has been doing nothing, and, by depressing the abdominal wall below the umbilicus, we are enabled to get the fingers behind the fundus and to draw it forwards, while with the vaginal finger

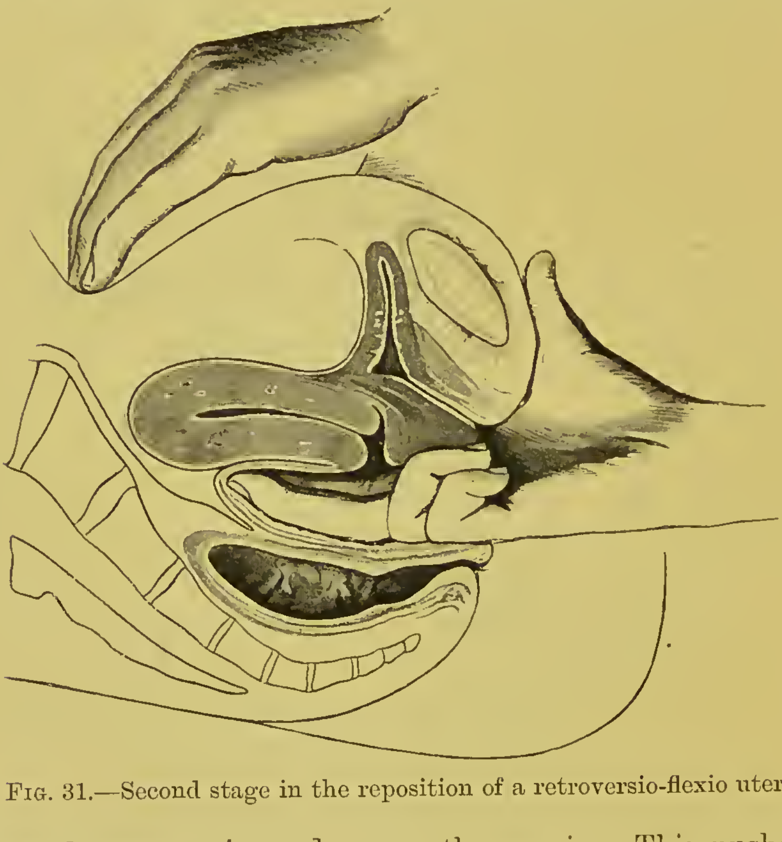


FIG. 31.—Second stage in the reposition of a retroversio-flexio uteri.

in the anterior fornix we continue to press the cervix backwards. Finally, we are able to palpate the body of the uterus through the anterior fornix and recognise the fact that it is lying in front (*v.* Fig. 33). If one finger is not long enough to replace the uterus, insert both index and middle fingers, as shown in the diagram, a proceeding which adds on about half an inch to the possible upward reach of the fingers.

If the fundus is bound down by adhesions in a position of retroversion, it will not be possible to correct the displacement without first separating such adhesions. This is best accomplished by Schultze's method (*v.* page 336), to perform which the patient requires to be under an anæsthetic. The treatment of those cases in which Schultze's method of breaking down adhesions fails, or is contra-indicated, will be discussed in the chapter on pelvic peritonitis (*v.* page 197). In some cases, in which the uterus cannot be replaced by the fingers in the vagina, reposition can be accomplished by passing the middle

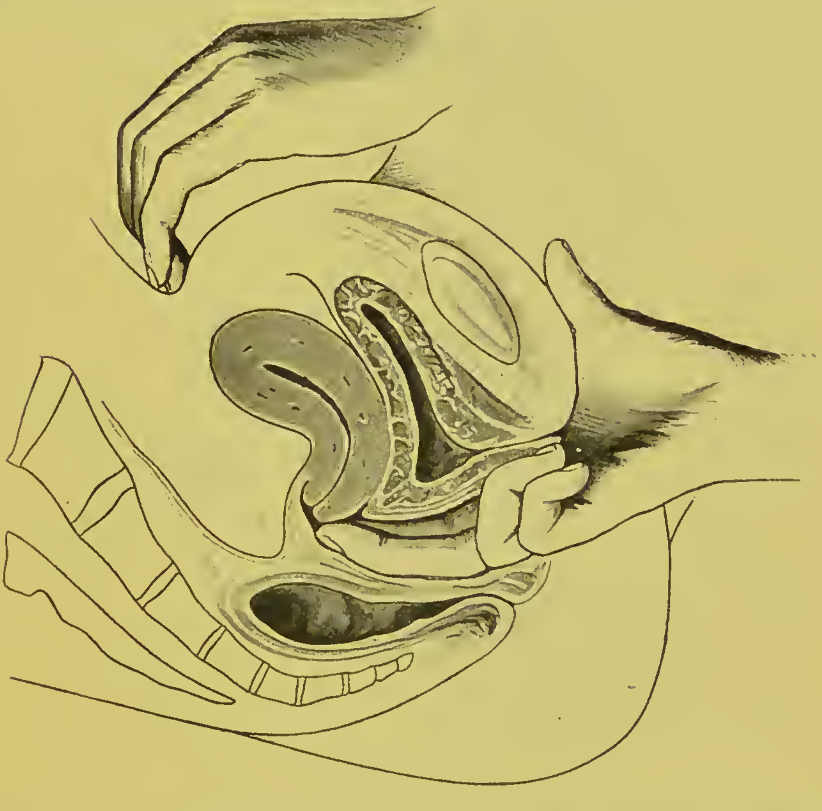


Fig. 32.—Third stage in the reposition of a retroversio-flexio uteri.

finger into the rectum and the index finger into the vagina, and pushing up the fundus with the rectal finger.

As soon as the uterus has been replaced, the next question is—What are the best means of keeping it in its proper position? In the majority of cases a pessary of some kind—probably Smith-Hodge—will be found most suitable. If, however, there is any pelvic tenderness, or if the uterus is very soft and congested, there may be some difficulty in finding a pessary which will not cause pain. In such cases, it is best to attempt to keep the uterus in its position by means of tampons in the vagina, composed of cotton wool soaked in glycerine, or preferably ichthyol glycerine, as the latter has a superior effect in relieving the congestion. These plugs should be changed, if possible, every day, if not, certainly every second day, and their use is continued until congestion and tenderness have disappeared. A pessary may then be inserted.

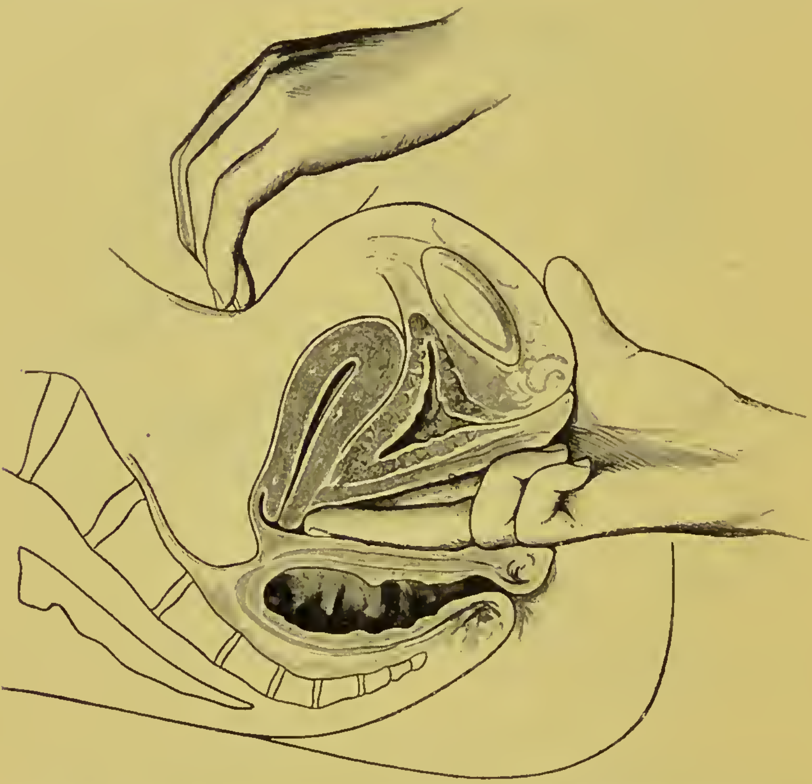


Fig. 33.—Final stage in the reposition of a retroversio-flexio uteri.

The same rules apply to the insertion of a pessary in cases of retro-deviations of the uterus as in cases of prolapse (*v.* page 72). The form of instrument which is usually found to be most suitable is a Hodge, or that modification of it known as Smith-Hodge. This pessary is usually made in vulcanite, but the celluloid form is preferable, as its shape can be more easily changed in order to adapt it to any particular case. Either of these forms of pessary keeps the uterus in a position of anteversion by pushing up the posterior vaginal fornix, and so tightening the posterior ligaments and drawing the cervix further backwards. The uterus must be in its normal position before the pessary is inserted. The latter is then held in the fingers of the right hand, while the fingers of the left hand separate the labia. It is pushed gently upwards through the vulva, its larger end first and its transverse diameters corresponding to the antero-posterior diameter of the vulva. As soon as the larger end of the pessary has passed into the vagina, the index finger of the right hand is slipped up behind the pessary and by pressure on its upper end guides it over the cervix. At the same time, the whole pessary is gently rotated until it comes to lie with its transverse diameters corresponding to the transverse diameters of the vagina.

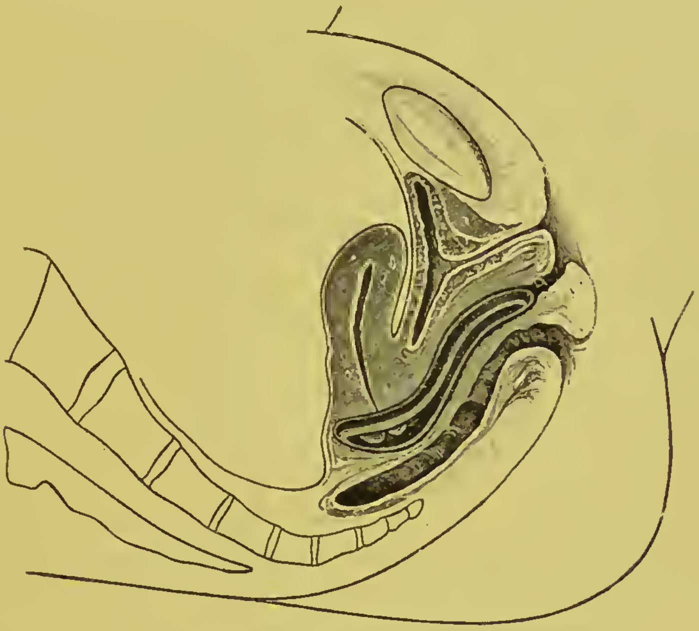


FIG. 34.—Diagram representing a Smith-Hodge pessary *in situ.*

so that it now lies with its larger end in the posterior fornix, *i. e.* above and behind the cervix, and with its greater concavity forwards (*v.* Fig. 34). Care must be taken that the narrow end which is lowest does not press to an injurious extent upon the urethra.

A pessary must not be left *in situ* for a longer period than three months, without removing it for cleansing purposes. If the vaginal discharge is alkaline or very profuse, the patient should use a vaginal douche daily. Occasionally, a hard vulcanite ring pessary, or that form known as Thomas' pessary (*v.* Fig. 25, B, C), will be found more suitable than the Smith-Hodge.

(B) **Radical Treatment.**—The radical treatment of retro-deviations includes those operations by which the uterus is moored in a position of anteversion, or anteversion and anteflexion. Such operations are divisible into two groups :—

(1) Operations directed to the permanent fixation of the body of the uterus in a forward position.

(2) Operations directed to the shortening of the ligaments which aid in keeping the uterus in a forward position.

(1) In the first group come the operations known as vaginal fixation or hysteropexy, and ventral fixation or hysteropexy. Vaginal hysteropexy consists in suturing the uterus to the anterior vaginal wall after first separating the bladder and pushing it upwards out of the way. It can be performed by several methods, of which perhaps the best and most easily carried out is that described by Mackenrodt (*v.* page 376). Ventral hysteropexy consists in opening the abdomen in the middle line and suturing the uterus to the abdominal wall (*v.* page 373).

The objections urged against both these operations are that (a) they bring the uterus from one malposition into another, *i. e.* from a position of *retroversio-flexio* into a position of excessive anteflexion in the case of vaginal fixation, or into a position of ascent and anteposition in the case of ventral fixation ; that (b) they fix the uterus in a single position, whereas the normal condition of the uterus is one of great freedom of movement; and that the result of this obstacle to free movement may be interference with the distension of the bladder at all times, and with the proper development of the uterus and the progress of parturition if the patient should become pregnant.

(2) The only operations in the second group, which need be considered, are those directed towards the shortening of the round ligaments. Operations for the shortening of the utero-sacral ligaments have also been described. They are, however, of greater difficulty and danger than is commensurate with their benefit.

The round ligaments may be shortened either extra- or intra-peritoneally. In the extra-peritoneal method described by Alexander, they are shortened close to their termination at the external abdominal ring (*v.* page 392). The objections urged against this operation are that it is sometimes extremely difficult to find the ligaments, and that there is some risk of the occurrence of a subsequent inguinal hernia.

The intra-peritoneal operation consists in shortening the round ligaments on the anterior surface of the broad ligaments, either by the abdominal route (Wylie, Dudley) or by the vaginal route (Wertheim) (*v.* page 395). The objection to all methods of shortening is that the ligaments are very likely to again elongate, and so permit the displacement to recur. Its advantages on the other hand over all methods of fixation are:—that the uterus is brought into a more normal position; that it is free to move about to the physiological extent; and that, if Alexander's method is adopted, the operation can be performed without opening the peritoneal cavity.

On the whole, shortening of the round ligaments is, practically, perhaps a better operation than either of the forms of fixation for a case of *retroversio-flexio*, theoretically, it is undoubtedly better. One reason why vaginal fixation is more largely adopted, is that the condition which calls for the correction of the malposition of the uterus usually calls also for some other vaginal operation, as curetting, amputation of the cervix, colporrhaphy, etc. Consequently, it is found to be more convenient to also adopt a vaginal operation for the fixation of the uterus. Even this reason is abolished, if Wertheim's operation is chosen.

The necessity for any form of radical treatment of backward displacement of the uterus, is a subject on which there is much difference of opinion. Many authorities think that the operation required is more serious than the condition which it is called upon to relieve. As there are undoubtedly many patients whom a radical operation has been the means of saving from a condition of chronic invalidism, while at the same time the great majority of those who suffer from backward displacement do not require any such treatment, it may not be out of place to attempt to lay down a few rules to govern the adoption of palliative or radical treatment in these cases.

(1) Palliative treatment is at first indicated in all cases, as it may bring about the cure of the condition, or the patient may be able to wear a pessary continuously without either discomfort or injury.

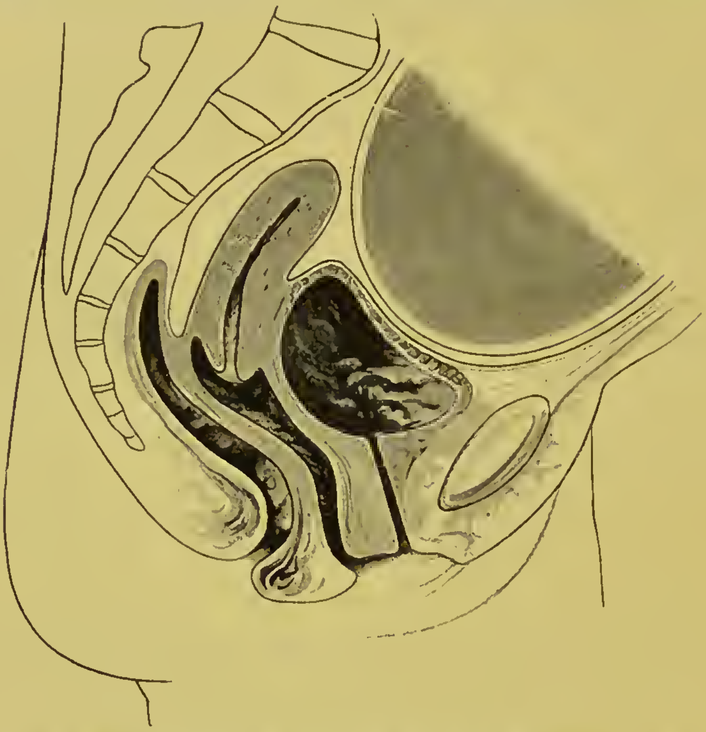


Fig. 35.—Retroposition of the uterus due to the presence of a distended bladder and an abdominal tumour.

(2) Radical treatment is indicated :—

- (*a*) Where a pessary, which will keep the uterus in a normal position, cannot be found.
- (*b*) Where the wearing of a pessary is associated with continual discomfort, or with the occurrence of vaginitis.
- (*c*) Where the patient lives under circumstances which preclude her from obtaining the necessary periodical medical advice.

Retroposition.—Retroposition of the uterus is the result of tumours or enlargements situated in front of the uterus and which drive the latter backwards (*v.* Fig. 35), and of adhesions or cicatricial contractions of the posterior ligaments pulling it back.

Treatment.—Retroposition of the uterus, when due to the pressure of tumours, etc., can only be cured by the removal of the latter. When due to the presence of adhesions or to shortening of the utero-sacral ligaments, it may be relieved by the stretching of such adhesions. This class of case will be more suitably discussed under pelvic peritonitis.

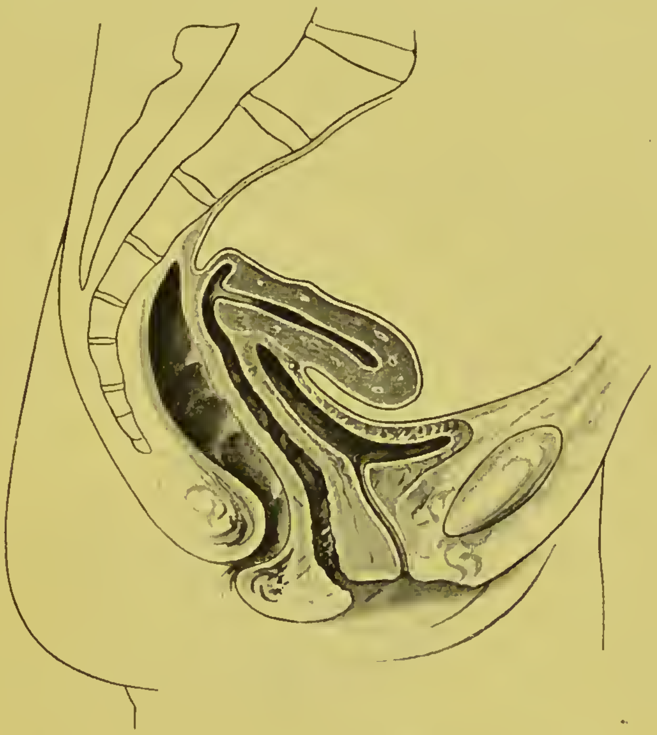


Fig. 36.—Pathological anteversion of the uterus due to dragging backwards of the entire cervix.

Forward Displacements.

Forward displacements of the uterus include some degrees of anteflexion and anteversion, and anteposition. A marked degree of anteversion of the uterus and a slight degree of anteflexion are, of course, the normal position.

Anteversion and Flexion.—There is considerable difficulty in determining where to draw the line between the normal anteversion and anteflexion of the uterus, and what is known as pathological anteversion and anteflexion. Schultze suggests that "anteversion and anteflexion are pathological when they are stable, that is when the normal movements of the uterus out of these positions are impeded." He gives the following as suitable definitions :—

Pathological anteversion is that position of the uterus in which, extended in shape, it lies with the fundus forwards, and is more than normally stable (*v.* Fig. 36).

Pathological anteflexion is that position of the uterus in which, permanently flexed over its anterior surface, it lies with the fundus forwards and is more than normally stable (*v.* Fig. 37).

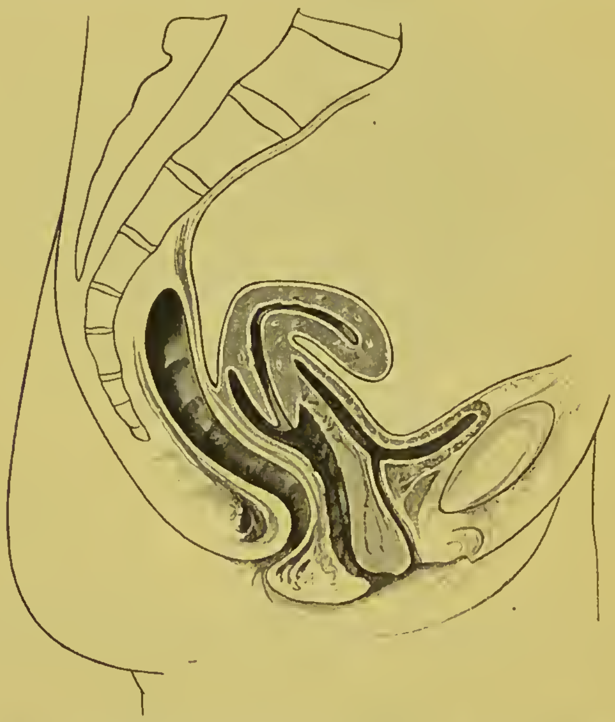


FIG. 37.—Diagram representing acute anteflexion of the uterus. There is also some degree of retroposition.

Pathological anteversion is not a condition of very much importance. It may be caused by the excessive uterine rigidity which results from metritis; by shortening of the utero-sacral ligaments dragging the entire cervix backwards; and by small tumours situated at the fundus. The symptoms which are associated with it are generally referable to the cause of the condition more than to the condition itself, *i. e.* to the metritis or pelvic peritonitis as the case may be. Occasionally, a marked degree of pathological anteversion may cause irritability of the bladder. The treatment is directed towards the cure or relief of the cause.

Pathological anteflexion is a condition of more importance. It is often found in association with retroposition of the uterus, with stenosis of the cervical canal, and with conical elongation of the cervix.

Ætiology.—Pathological anteflexion of the uterus may arise as a result of:—

(1) Shortening of the utero-sacral ligaments, or the formation of retro-uterine adhesions which drag the isthmus backwards while leaving the fundus free. These cases are associated with retroposition and retroversion of the uterus.

(2) Persistence of the infantile type of uterus. These cases are associated with conical elongation of the cervix and stenosis of the cervical canal, and are probably due to partial failure of development of the anterior uterine wall.

(3) Vaginal fixation of the uterus. These cases rarely if ever give rise to any symptoms.

Symptoms.—The symptoms can, as a rule, be referred to:—

(1) The acute bend which is found at the junction of the body and cervix.

(2) The stenosis of the cervical canal.

(3) The accompanying endometritis.

[illegible] obstructive theories

The most prominent of them are (a) dysmenorrhœa, (b) sterility, and (c) menstrual troubles of a variable nature. The direct cause of the first two is still a matter of some dispute. The pain comes on a day or so before the menstrual discharge, usually ceases on the appearance of the latter, and is severe and paroxysmal in character. Its origin has been attributed variously to the irritation and compression of the uterine nerves caused by the menstrual congestion of the uterus (Fritsch), and to the uterine contractions set up by the retention of menstrual discharge owing to the obstruction caused by the flexion and the stenosis of the cervical canal (Sims). In the latter connection, it may be mentioned that the expulsion of clots from the uterus is found to be attended by the relief of the pain, and any cessation in their expulsion by the return of the latter. The objections urged against the obstructive theory of dysmenorrhœa in these cases have been already referred to (*v.* page 22), and need not be again mentioned.

Sterility is caused, in all probability, by the endometritis which is usually present. It is also suggested that the flexion and the stenosis may be a bar to the entrance of the spermatozoa, but, when the minute size of these is taken into account, this does not appear very probable, save on the supposition that, as suggested by Dührssen, the mucous membrane of the stenosed cervix does not become everted during coitus, and that consequently the spermatozoa are left for a longer period in the vagina than is normal. In some cases, sterility is due to the non-development of the uterus or ovaries.

Menstrual troubles are the result of the accompanying endometritis, and vary in different cases. Usually, menstruation is scanty, but, on the other hand, it may be profuse, and there may be metrorrhagia.

On examination of the patient, the uterus is usually found to be small and somewhat retroposed, with a knob-like prominence in front, *i. e.* the body. The cervix is generally elongated and conical, and the external os may be so small that it cannot be felt. If an attempt is made to pass a sound, the latter is arrested at the level of the internal os. Sometimes, it cannot be made to pass into the uterus, but generally it can be inserted by increasing the bend.

Treatment.—It is useless to attempt to correct the flexion; all that can be done is to endeavour to remove, as far as possible, the stenosis of the cervix and the obstruction caused by the acute bend, and to cure the endometritis. The treatment is the same as that described in the case of stenosis of the cervix (*v.* page 56), viz. dilatation (*v.* page 322) or some form of posterior division preferably Dudley's (*v.* page 319), and curetting (*v.* page 325). The occurrence of pregnancy cures the condition. If there are adhesions dragging the uterus backwards, or shortening of the posterior ligaments, some relief may be obtained by endeavouring to break down or stretch the adhesions, or to stretch the ligaments (*v.* page 336).

Anteposition.—Anteposition of the uterus is that condition in which the uterus as a whole is displaced in a forward direction. It is most usually caused by tumours, or accumulations of blood, pus, or distended intestines in Douglas' pouch (*v.* Fig. 38). More rarely, it is caused by cicatricial contractions,—the remains of an anterior parametritis dragging the uterus forwards towards the symphysis. The symptoms, which arise from anteposition of the uterus, are due to the cause of the displacement rather than to the displacement itself. If the latter is due to tumours or other enlargements, the treatment suitable to them prevails; if to old parametritis, attempts must be made to get the exudation reabsorbed.

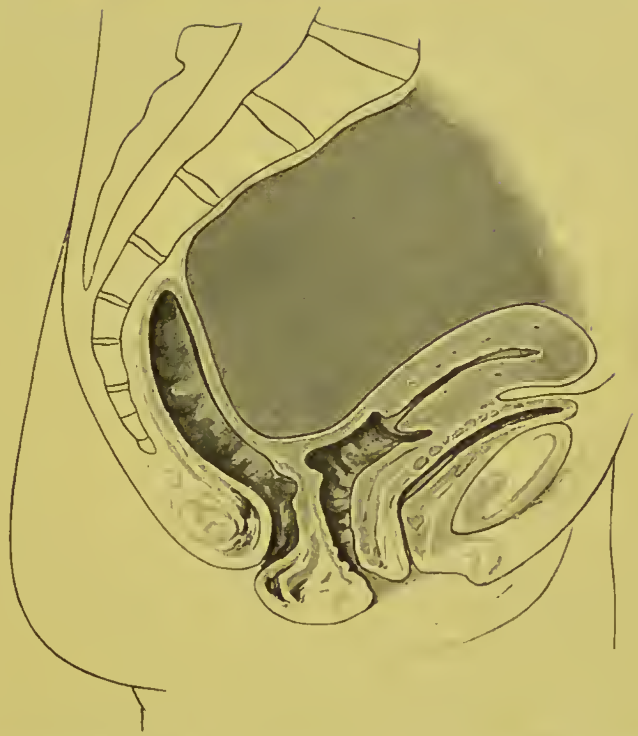


Fig. 38.—Anteposition of the uterus due to the presence of a tumour in Douglas' pouch.

Lateral Displacements.

Lateral displacements of the uterus include dextro- or sinistro-version or flexion, and dextro- or sinistro-position. The meaning of these terms has been already explained (*v.* page 59).

Ætiology.—Dextro- or sinistro-version and -flexion are most frequently caused by contraction of one broad ligament occurring as a result of parametritis, and by the adhesions formed in the course of an attack of pelvic peritonitis. More rarely, these displacements are due to the pressure of tumours. The side to which the uterus is deflected depends upon the part of the broad ligament which has become shortened. If the contraction takes place at the top of the ligament, then the body of the uterus is displaced to the same side as the contraction. If the contraction takes place about the level of the os internum, then the cervix is dragged to that side, while flexion of the body occurs in the opposite direction (*v.* Fig. 39).

Dextro- or sinistro-position of the uterus is produced by very much the same causes as is the foregoing. That is to say, tumours and enlargements, particularly when they occur between the layers of the broad ligament, contractions of the broad ligament, and peritoneal adhesions. A unilateral parametric exudation is a common cause, and will tend to push the uterus towards the opposite side of the pelvis. When the same exudation has undergone absorption, and is represented by a contracted ligament, the latter will pull the uterus towards the same side of the pelvis. In such cases, dextroposition of the uterus is frequently associated with sinistroflexion, or *vice versâ* (*v.* Fig. 39).

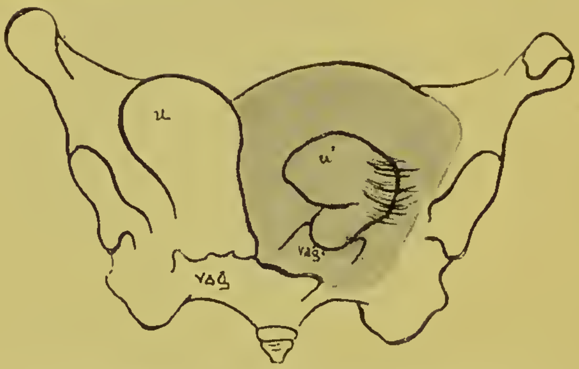


FIG. 39.—Diagram representing some lateral deviations of the uterus. *u.* Uterus in extreme dextroposition, the result of the pressure of an exudation in the right broad ligament (shaded portion). *u'.* The same uterus in a position of sinistroversion, dextroflexion, and sinistroposition as a result of the absorption of the exudation and the consequent cicatricial contraction of the ligament (Schultze).

Treatment.—The treatment of these cases is determined by the cause. Those displacements which are due to the presence of a tumour will be corrected by the removal of the tumour. The treatment of those cases due to inflammatory changes will be discussed under pelvic peritonitis.

TORSION.

Torsion of the uterus consists in a rotation of the uterus on its axis, as a whole, away from the median plane, either towards the right—dextrotorsion, or the left—sinistrotorsion. The normal position of the uterus is one of slight dextrotorsion. "The normal position of the uterus is not exactly median, the anterior surface of the uterus facing the bladder does not look exactly forwards, but rather forwards and to the right, and when the bladder is empty the vaginal portion lies rather to the left, the fundus rather to the right of the median plane" (Schultze). A pathological degree of torsion is most frequently associated with an unequal degree of contraction or relaxation of the utero-sacral ligaments, as occurs in posterior parametritis or peritonitis, and in subinvolution.

The diagnosis of a pathological degree of torsion is made by careful bimanual examination. The treatment is that of the pathological condition with which the torsion is associated.

INVERSION.

When the form of the wall of the uterus is altered in such a manner that the inner surface of the organ is turned outwards, and the outer surface inwards, the uterus is said to be inverted (Schultze). This form of uterine displacement is exceedingly rare, and is apparently becoming more so every day—a fact probably due to the more frequent early cure of those conditions (submucous myomata) which predispose to the occurrence of chronic inversion, and to the better management of the third stage of labour in the case of acute inversion.

Degrees.—Schultze describes three degrees of inversion. They are as follows:—

(1) The first degree comprises those cases in which the inverted fundus lies at or above the os externum. This degree, which is

the initial stage of all inversions, is rarely if ever permanent, as it tends either to become reduced, or else to continue and pass into one of the succeeding degrees.

(2) The second degree comprises those cases in which the fundus has passed lower down, and in which more or less of the inverted uterus lies below the external os. It is the degree in which chronic inversion is most usually met.

(3) The third degree comprises those cases in which the entire uterus, including the cervix, has become inverted. It is very rarely met with as a degree of chronic inversion, but an acute inversion is probably frequently found in this condition.

Varieties.—Two varieties of inversion are met with :—

I. Acute inversion.
II. Chronic inversion.

I. ACUTE INVERSION.—Acute inversion is, strictly speaking, an obstetrical condition, but perhaps it is advisable to say a few words about it here. An inversion of the uterus is termed *acute* when it occurs immediately after confinement. It is said to be the commoner variety of inversion, although it is one of the rarest of obstetrical complications.

Ætiology.—Three conditions must be associated in order to permit the occurrence of either the second or third degree of
i inversion (Schultze) :—enlargement of the cavity of the uterus;
ii relaxation of part of its wall; and a cervix which is sufficiently
iii dilated, or capable of being sufficiently dilated, to allow the
passage of the body of the uterus. All these conditions are fulfilled after delivery in those cases in which the uterus does not contract well. With these conditions present, if the intra-uterine pressure becomes less than the intra-abdominal pressure the fundus dimples in, and, if this relationship between the two pressures is continued, inversion goes on until it has become complete. Accordingly, any factor which brings about this relationship between the two pressures may be regarded as the exciting cause of the inversion. The principal of these factors are :—

(1) Dragging upon the placental site—in the case of a fundal insertion of the placenta—by pulling upon the cord while the placenta is still adherent.

(2) Violent straining associated with sudden emptying of the uterus, as :—precipitate labour; or severe straining and pressure,

in the removal of the placenta, while the uterus is in a relaxed condition (Winckel).

Symptoms.—The occurrence of acute inversion is most usually marked by the collapse of the patient, a collapse which may come on either immediately after inversion occurs, or, more rarely, after a few hours. If the placenta has been separated in part or altogether, there will also be severe hæmorrhage.

Diagnosis.—If the hand is placed upon the abdominal wall, the absence of the fundus of the uterus from its usual position will be readily determined. If a careful bimanual examination is made, it may be possible to determine the existence of a cup-shaped depression corresponding more or less exactly to the former position of the cervical canal. At the same time, the vagina is found to be occupied by a globular tumour to which the placenta may or may not be attached, or in extreme cases the vagina may be also partially or completely inverted, and so the inverted uterus lie in part or altogether outside the vulva. The diagnosis is then at once obvious. If the inversion is only partial, the fundus of the uterus will be felt with a similar cup-shaped depression in the centre of it.

Treatment.—The treatment consists in the detachment of the (١) placenta, the replacement of the uterus, and the adoption of measures calculated to keep it in its normal position.

There is nothing special to be said with regard to the removal of the placenta, it is carried out in the ordinary manner, the greatest care being taken to ensure asepsis. The replacement (٢) of the uterus is usually not a very difficult matter in acute cases. The uterus is grasped in the hand, and pushed gently upwards, endeavouring to return first the part that came down last. If the size of the uterus prevents its reduction, it is possible that the proceeding would be facilitated by producing a temporary partial anæmia of the uterus by the application of adrenalin, and so a temporary reduction in the size of the uterus. At any rate, adrenalin might be tried, as if used in a sterile condition it could cause no harm and might prove of value.

As soon as the uterus has been replaced, it is douched out thoroughly, and plugged firmly with iodoform gauze with the object of preventing the recurrence of the displacement.

Prognosis.—An acute inversion, if left untreated, is frequently fatal. If the patient survives, it passes into the chronic condition. If the condition is recognised, and treated before the patient has lost an excessive quantity of blood, and before the uterine cavity has become infected, the prognosis is fairly good.

II. CHRONIC INVERSION.—Chronic inversion is the term applied (a) to an acute inversion which has not been reduced, and in which the patient has survived, and also to an inversion which slowly (2) produces itself in a non-parturient uterus.

Ætiology.—As has just been mentioned, a chronic inversion i. may be the remains of the acute variety. Such a cause for chronic inversions is however rare, as, if an acute inversion is not treated, the result for the patient is generally fatal. The common cause of chronic inversion is the presence of a sessile or polypoid myoma in the uterine cavity, which, during the process of its expulsion, drags the fundus downwards after it (*v.* Fig. 40). Scanzoni considered that sessile myomata have even a greater tendency than polypi to produce inversion, a result which he attributes to thinning of the muscular tissue at the seat of attachment of the tumour. Also, if a tumour with a long pedicle is expelled from the uterus, the cervical canal has sufficient time to close behind the tumour before the fundus is pulled down into contact with it by the tumour; whereas, in the case of a

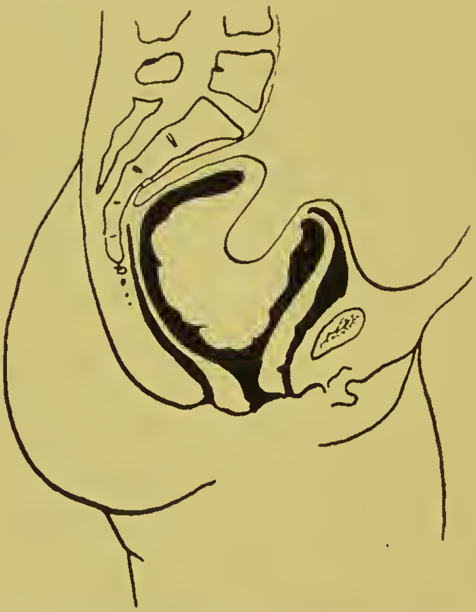


FIG. 40.—Complete inversion of the uterus, the result of a sessile myoma springing from the fundus. (*Schultze*).

sessile tumour, the fundus follows the tumour so closely that it finds the cervix sufficiently dilated to allow it to descend into the vagina.

Symptoms.—The symptoms are recurrent hæmorrhages more or less profuse in amount, sacral pain, a feeling of weight in the pelvis and an inclination to strain, and, if the tumour or the uterine wall sloughs, a profuse fœtid discharge. In some cases, descent of the uterus accompanies the inversion, and then a tumour will be found outside the vagina; if there is no descent, the tumour will occupy the vagina.

Diagnosis.—The diagnosis of inversion will be readily made by a bimanual examination. A tumour will be found in the vagina, and the body of the uterus will have disappeared from its usual position. If the patient is not too stout, a cup-shaped depression, as in the acute form, will be felt just above the roof of the vagina, and the ovaries may be palpated at the edge of it.

An inverted uterus has to be distinguished from a polypus projecting from a normally situated uterus into the vagina. The two conditions resemble one another somewhat, if only a cursory examination is made, but, if the case is carefully examined, no difficulty presents itself. The distinguishing points are :—That in the case of inversion the body of the uterus is not to be found in its usual position, while in the case of a polypus it occupies its usual position. Again, in a polypus, the cervical ring can be felt surrounding the pedicle, and, if a sound is passed through this ring by the side of the pedicle, it will pass upwards into the uterine cavity. In the case of an inverted uterus of the third degree, no such ring will be found, and it will be impossible to pass a sound upwards beside the tumour. In the case of an inverted uterus of the second degree, a ring can be felt round the tumour, but the sound can only be passed upwards through it to a very slight extent.

Treatment.—Chronic inversion of the uterus may be treated by the following methods :—

(1) Gradual reduction of the inversion, after removal of any tumour present.

(2) Rapid reduction of the inversion, after removal of any tumour present.

(3) Extirpation of the inverted uterus.

(1) **Gradual Reduction.**—Gradual reduction of the uterus can

be effected in many cases after the removal of any tumour present, by the prolonged use of some form of repositor, as Aveling's or Tait's, or by plugging the vagina with iodoform gauze in such a manner as to cause an upward pressure on the inverted uterus (Pozzi). The gauze is changed daily until the inversion is reduced. Gradual reduction is, however, being given up to a large extent, and its place taken by some form of rapid reduction.

(2) **Rapid Reduction.**—Rapid reduction is performed manually either without or with preliminary dilatation of the narrow isthmus of the inverted uterus. In all cases, an attempt should be first made to replace the uterus with the hand, as in the acute form. Two methods of doing this are shown in the accompanying diagrams (*v.* Figs. 41, 42). In method A, the last part of the uterus which was inverted is the first to be replaced, and the fundal inversion is not reduced until the last. As a result, at no time is more than one ring of uterine tissue passing through the obstructing isthmus. In method B, on the other hand, the fundal inversion is first reduced, and as a result two rings of uterine tissue have to pass through the isthmus at the same time. In order to gain extra power, Freund inserts several silk sutures through the ring of cervical tissue, and by their help draws down the cervix as he presses up the body. If method A fails, the advantages of method B can be obtained without adding to the number of rings of uterine tissue which have to pass through the isthmus in the following manner (Schultze) (*v.* Fig. 43) :—Draw the uterus downwards as far as possible, so that the fundus descends from *a* to *b*, and so convert an inversion of the second

Fig. 41.

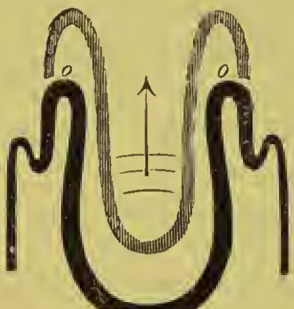


Fig. 42.

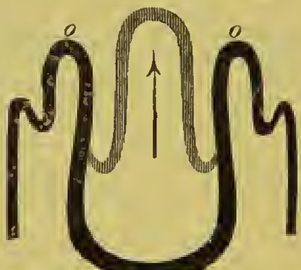


FIG. 41.—Method A, of reducing a chronic inversion of the uterus. (*Schultze.*)
FIG. 42.—Method B, of reducing a chronic inversion of the uterus. (*Schultze.*)

degree into one of the third degree. Then, endeavour to fix the edge of the funnel as firmly as possible at *o′*, press the fundus upwards towards *c*, and finally to *d*, as shown.

If manual reduction—as described—fails, and the patient has not reached the menopause, and hence it is advisable to preserve the uterus if possible, various operative proceedings have been recommended with the object of directly dilating the constricting isthmus. The operation, which appears to be at once the safest and to offer the best chance of success, is that originated by Küstner (*v.* page 379). He incises the constricting isthmus, after performing posterior colpotomy, and then reduces the body through the widened passage thus obtained. Another method of dilating the isthmus is by opening the abdomen in the middle line, and then forcibly dilating the constricting ring with the fingers or with metal dilators. It is a course of procedure which has not very much to recommend it, and has failed several times in the most skilful hands.

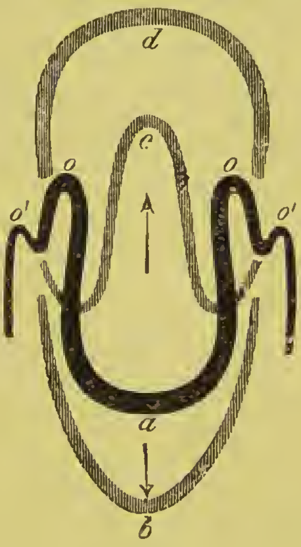


FIG. 43.—A modification of method B of reducing a chronic inversion. (*Schultze.*)

(3) **Extirpation.**—Extirpation of the inverted uterus, by vaginal hysterectomy, is the line of treatment indicated in the presence of a tumour which cannot be removed without permanently damaging the uterus, or which is found to be malignant. It is also indicated in women who have passed the menopause in preference to too violent attempts at reposition, and in young and middle-aged women as a *dernier ressort*.

a
b.
c

CHAPTER VIII.

DISEASES OF THE UTERUS (*continued*).

Traumatic Lesions of the Uterus. Inflammatory Diseases of the Uterus—Corporeal Metritis: Acute; Ætiology, Pathology, Symptoms, Complications, Treatment: Chronic; Myometritis, Ætiology, Pathology, Symptoms, Treatment; Endometritis, Varieties, Ætiology, Pathology, Symptoms, Treatment—Cervical Metritis: Acute; Ætiology, Pathology, Symptoms, Complications, Treatment; Chronic, Ætiology, Pathology, Symptoms, Treatment.

TRAUMATIC LESIONS OF THE UTERUS.

Traumatic lesions of the uterus may occur during parturition. The commonest of them is laceration of the cervix, a condition which is associated with endometritis and endocervicitis. It will be discussed in the chapter on "Traumatic Diseases."

INFLAMMATORY DISEASES OF THE UTERUS.

Inflammatory diseases of the uterus can be included under the one term *metritis* (*μήτρα*, the womb) or inflammation of the uterus, and this can be subdivided as follows:—

- Metritis
  - Corporeal
    - Acute
    - Chronic
      - Myometritis.
      - Endometritis.
  - Cervical
    - Acute
    - Chronic

Corporeal Metritis.

Corporeal metritis, that is metritis of the body of the uterus, is met with in two varieties:—

I. Acute corporeal metritis.
II. Chronic corporeal metritis.

I. Acute Corporeal Metritis.—Acute corporeal metritis may be subdivided according as it attacks the muscular wall—myometritis, or the endometrium—endometritis, if it is thought well to do so. As however the two conditions probably always coexist, such a course seems unnecessary. It will accordingly be discussed under a single heading.

Ætiology.—Acute metritis is the result of the infection of the uterus with pyogenic organisms. It occurs most frequently as the result of gonorrhœal infection, or of septic infection occurring during or after parturition, or during operative interference with the uterine cavity. Acute metritis also occurs during the course of severe attacks of the eruptive fevers.

Gon
Seps
Erupt

Pathology.—The uterus is enlarged, soft, and very much congested. The endometrium is swollen, injected, and covered with a purulent discharge. In some cases, this may become pseudomembranous in character, constituting the so-called diphtheritic endometritis. The muscular coat is also congested, and minute points of pus may be found. Under the microscope, groups of small round cells are seen scattered between the muscle-fibres, especially round the vessels, and the lymph channels and veins contain colonies of the infecting bacterium. These colonies are also found in the uterine lymphatic glands and in the discharge. In very severe cases, the greater part of, or the entire, endometrium may be thrown off as a slough.

mem.

Symptoms.—The uterus is slightly enlarged, and is very tender. A more or less profuse purulent discharge escapes from the cervix. The temperature is high, reaching 103° to 105° F. The pulse is very rapid, and may range from 120 to 140. There are the general symptoms of septic absorption, or of actual acute sepsis. The patient complains of intense pain over the uterus, and, if the infection extends beyond the uterus, there are the symptoms of peritonitis.

Pain
Tend
Purule
Dis
Saprae
or
Septi
Pyaem
may be Perit

Complications.—The great danger of acute metritis is that of extension. This may occur in several directions:—

(1) Into the general circulation,—(*a*) *viâ* the veins, (*b*) *viâ* the lymphatics; so causing (*a*) pyæmia, (*b*) lymphatic sepsis.

(2) Into the tubes, and from there into the peritoneal cavity, so causing salpingitis, pyosalpinx, and local or general peritonitis.

(3) Into the parametric tissues, so causing parametritis.

These secondary conditions will be discussed in their proper place.

Treatment.—The correct treatment to adopt in cases of acute gonorrhœal endometritis cannot be regarded as definitely settled. Some authorities recommend to refrain from all local interference. If this course is decided upon, the patient should be kept at rest in bed, the bowels kept free, suitable nourishing food administered, and attempts made to relieve the pain. With the last object, hot stupes are applied to the hypogastrium, and warm vaginal douches are given. Leeches may also be tried, and should be applied over the hypogastrium. If any complications—peritonitis, general sepsis, etc.—occur they must be treated. On the other hand, some authorities recommend—and we consider rightly—the adoption of a more active treatment, consisting in the main of attempts to kill the infecting organism. If the infection is limited to the cervix, the latter should be well wiped out with small pieces of cotton wool twisted round the end of a probe, and then treated with one or other of the different antiseptics which are known to exercise a germicidal effect on the gonococcus. Perhaps the best of these is protargol, used in a 2 to 5 per cent. solution. It may be applied at intervals to the cervical canal through a speculum, or the cervical canal may be plugged with a small piece of gauze soaked in the protargol solution. If the uterine cavity is also infected, it may be plugged with a similar piece of gauze. As this gauze has a powerful bactericidal effect on the gonococcus, the danger of causing an extension of the infection need not be feared, as any micro-organisms coming into contact with the protargol will be killed. The gauze should be changed every forty-eight hours. When the acute stage of the infection has passed off, the infected mucous membrane should be removed with the curette, and the cavity again treated with protargol. The mode of preparing protargol solution has been already described. (*v.* page 27).

Septic metritis—metritis due to the entrance of streptococci or staphylococci—must be treated in a more active fashion. Intra-uterine douches must be given at least once and sometimes twice a day, and, if there are any fragments of placental or decidual *débris*, the uterus must be curetted with a blunt Rheinstadter's curette. Perhaps, the most beneficial treatment of all consists in combining with douching and curetting the firm plugging of the uterus with iodoform gauze. The plug must be changed once or twice daily until the temperature falls and all fœtid discharge ceases. Most cases of septic metritis rapidly respond to this treatment. At the same time, stimulants must be freely administered to the patient, and every means of keeping up her strength resorted to. In streptococcic infection the use of antistreptococcic serum may be tried. The results which have so far followed its use are, however, discouraging. Complications are treated as they occur.

Of late, the injection of super-heated steam into the uterine cavity—a practice introduced by Snegirew—has met with considerable success in septic cases. The steam is injected through a carefully insulated catheter at a temperature of 239° F. for a period varying from fifteen to forty seconds. A convenient form of boiler for generating steam at this temperature has been devised by Pincus (*v.* page 327).

II. Chronic Corporeal Metritis.—Chronic corporeal metritis must be subdivided into two forms according to the part of the uterine body it attacks:—

(A) Chronic myometritis.
(B) Chronic endometritis.

Chronic Myometritis.—Chronic myometritis is the term applied to chronic metritis involving the muscular coat of the uterus, as opposed to chronic metritis involving the endometrium. This condition is also termed parenchymatous metritis—especially by continental writers, but, as the term parenchyma is generally used to signify the glandular portion of an organ, it is confusing to apply the adjective in the case of the uterus to the muscular portion. Myometritis is so closely connected with endometritis that it is doubtful whether it should be classified as a separate condition. Endometritis may occur without any accompanying myometritis, but the only case in which myometritis occurs without an antecedent endometritis is in the rare instances in which it results as the extension of neighbouring extra-uterine inflammatory conditions. On account of the extremely intimate connection between the endometrium and muscular coat of the uterus, infection of the former is almost certain to extend into the latter. If the extension is slight, it is masked by the symptoms of the accompanying endometritis, but if it is considerable, the existence of myometritis as a distinct condition can be determined.

Ætiology.—Chronic myometritis occurs most frequently as the result of the extension of chronic endometritis, or, more rarely, of peri- or parametritis, consequently it has the same ætiology (*v.* pages 109, 197). It is regularly found as a consequence of subinvolution of the uterus after delivery.

Pathology.—The pathological changes are not very well marked. The uterus is enlarged, and more rigid than normal. The muscle-fibres have lost their fibrillation, and clusters of leucocytes are found scattered between them, especially round the vessels. The coats of these last are considerably thickened (*v.* Fig. 44).

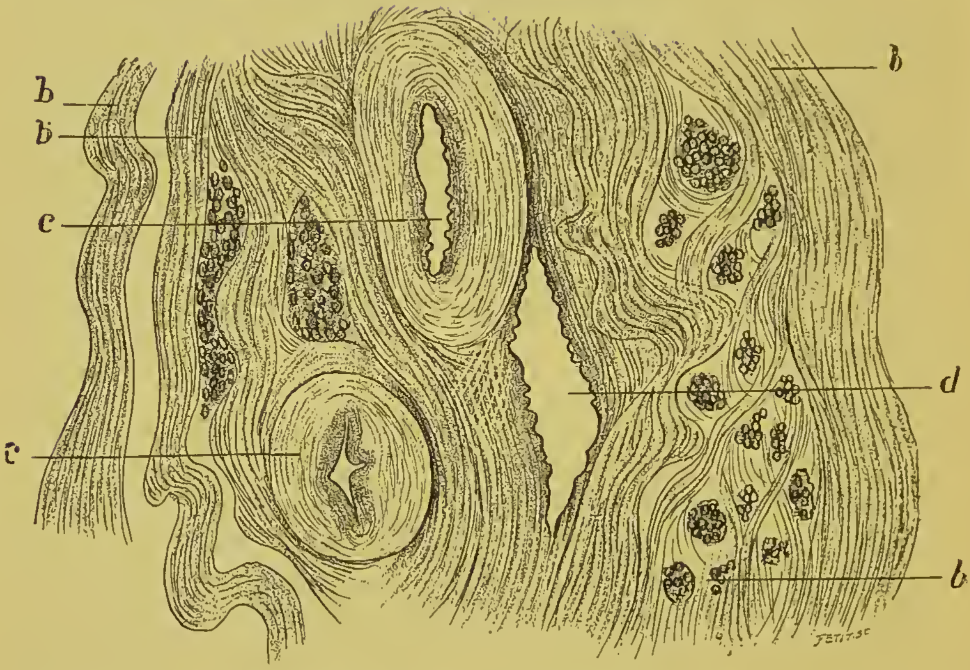


FIG. 44.—Chronic myometritis. Section through the muscular coat of the uterus. *a, a.* Muscle bundles. *b, b.* Connective tissue. *c, c.* Vessels with thickened walls. *d.* Lymphatic interspaces. (*Pozzi.*)

Symptoms.—The uterus is enlarged, and tender to the touch. It is frequently retroverted, and, if the fundus is in front, it is found that the normal anteflexion has disappeared, *i. e.* the uterus is anteverted only, a condition which is due to its increased rigidity. The subjective symptoms are those of the accompanying endometritis,—sacral pain, weight and tenderness in the pelvis, and various menstrual disorders; and, if the uterus is much enlarged and in a position of anteversion, there may be irritability of the bladder owing to the pressure of the heavy fundus.

Treatment.—The treatment of chronic myometritis is in the main the treatment of the endo-, peri-, or parametritis which causes it. If the uterus is much enlarged, involution may be hastened by the amputation of the cervix, or by the excision of a wedge-shaped portion of it (Dührssen).

Chronic Endometritis.—Chronic endometritis (ἔνδον, within; μήτρα) is the term applied to corporeal metritis when it attacks the endometrium. It is one of the commonest, or perhaps the commonest of gynæcological diseases, and is so closely connected with the majority of these diseases that in treating them measures must also be taken for its cure.

Varieties.—Chronic endometritis is met with in the following forms, classified according to their anatomical nature:—

(1) Glandular endometritis.
(2) Interstitial endometritis.
(3) Mixed glandular and interstitial endometritis.
(4) Hæmorrhagic endometritis.

Ætiology.—The causes of chronic endometritis are by no means as definitely ascertained as they ought to be. And even in those cases in which we consider that we know the actual cause, the manner in which it brings about its effect is extremely uncertain. Some authorities attribute all forms of chronic as well as acute endometritis to bacterial action. This is a difficult point to prove, as, in many cases, it is impossible to trace any connection between the onset of the endometritis and the occurrence of bacterial invasion. Also, in the greater number of cases of chronic endometritis it is impossible to prove the presence of any micro-organism. On the other hand, there is good reason to believe that bacteria may lie in a quiescent condition in some part of the genital tract waiting for favourable circumstances which will permit their development. And, furthermore, it is quite possible that a bacterial invasion of the uterus may take place, and set up a metritis, and that then the invading bacterium may disappear leaving behind it the effect of its visit.

Shortly stated, the bacterial theory of endometritis is as follows:—

(1) All endometritis is bacterial in origin.

(2) In order that the bacteria may obtain a foothold in the uterus, a certain predisposing condition is necessary.

(3) After the bacteria have disappeared, the effect which they have produced, *i.e.* metritis, may continue.

If we accept this theory of the causation of endometritis, we must look for two sets of causes:—

(1) Predisposing causes.
(2) Determining causes.

(1) *Predisposing Causes.*—All the predisposing causes of endometritis may be included under the one term *congestion,* as congestion undoubtedly brings the uterus into the most suitable condition for receiving and developing the bacteria. Consequently, in order to obtain a list of the predisposing causes of

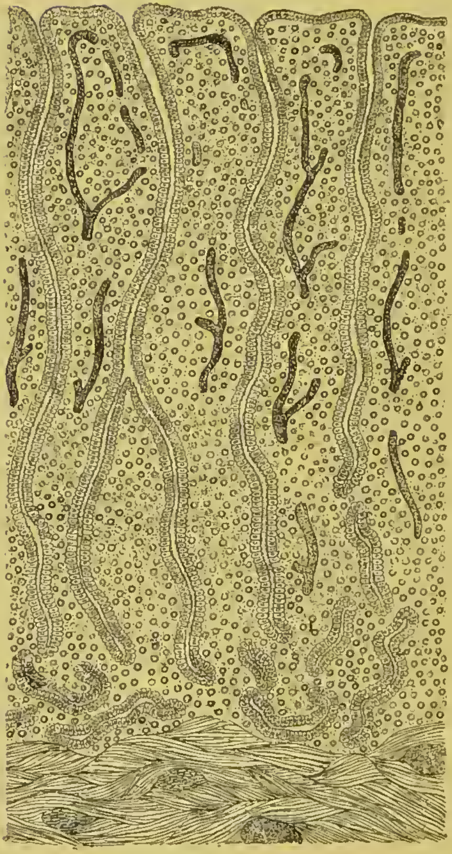


FIG. 45.—Section of the normal endometrium at right angles to the surface. Slightly enlarged. (*Wyder*).

endometritis, it is only necessary to enumerate the various conditions which can bring about the congestion of the endometrium. These conditions are :—

(a) Uterine displacements, malformations, tumours, and traumatisms.

(b) Menstruation, coitus, and parturition (subinvolution).

(c) Constipation, and pulmonary cardiac and renal disease.

(2) *Determining Causes.*—The determining cause of endometritis is to be found in some form of bacterial invasion. The commonest form met with is gonorrhœal, then septic and saprophytic, and most rarely syphilitic, tubercular, and diphtheritic.

It seems to the author as if in the bacterial theory there is a considerable mingling of cause and effect; and that this mingling is due—if he may be permitted to say so—to too forced attempts to differentiate between cause and effect without having sufficient preliminary knowledge to work upon. Even if bacteria are found in the uterus in all cases, or if, which is the same thing, the effects of their presence are found, it still does not prove that the invasion of the uterus by bacteria was the prime cause of the endometritis. For, while some of these cases may have directly owed their origin to bacterial invasion, other cases may have owed the invasion of the uterus by bacteria to the fact that endometritis had been previously started by some mechanical cause of congestion.

If we look for theoretical support for the bacterial theory of endometritis from pathological research, we shall find, that, not only are we unable to confirm this theory in all cases, or to reject it in all cases, but even in the majority of cases we are unable to say whether the presence of bacteria is the cause or the effect of the endometritis. If, again, we look for practical support for this theory from the prophylaxis of endometritis, as taught by experience, we shall find that we shall not be able to prevent the occurrence of the endometritis in all cases by alone preventing the entrance of bacteria, or by alone removing the mechanical cause of congestion. And, further, if we look for equally practical support from the treatment of endometritis, as taught by experience, we shall reach the same result. Our treatment, to be successful, must be directed both against a possible previous bacterial invasion, and against mechanical congestion-producing factors.

Accordingly, although the bacterial theory of the origin of all cases of endometritis may be advanced, and although in the future it may be possible to prove such a theory, and to obtain more satisfactory modes of treatment as a result of our increased knowledge, at present we are bound to look upon endometritis as arising from two intimately connected causes:—

(1) Bacterial invasion.
(2) Congestion of the uterus.

Either of these causes may be a primary one, but the presence of one in all probability draws in its train the onset of the other. Their combined effect upon the uterus is to produce one or other of the forms of endometritis described above. Prophylactic measures must be so directed as to prevent the occurrence of both causes, and curative measures must also be directed to their removal, and to the removal of their results, as being in themselves further exciting causes.

If we attempt to further classify the causes of endometritis on this basis, we shall get a classification very much the same as that adopted by Winckel:—

(1) *Bacterial Invasion.*—Gonorrhœal, tubercular, septic, saprophytic, diphtheritic, and syphilitic infection, infection by fungi, and infection by amœbæ.

see back.

(2) *Congestion of the Uterus.*—Uterine displacements, malformations, tumours, and traumatisms; subinvolution; tumours of the adnexa; excessive coitus; constipation; cardiac, pulmonary, and renal disease.

Pathology.—Macroscopically, the uterus is enlarged and congested; the mucous membrane is as a rule thickened, injected, and covered with small prominences and inequalities; and if the endometritis is of long standing, the muscular coat shows the lesions already described under the head of chronic myometritis (*v.* page 108).

Under the microscope, the predominant features of the form of endometritis with which we are dealing are to be seen. In glandular endometritis, the uterine glands are hypertrophied, and their number and ramifications are increased, so that the section resembles that of an adenoma (*v.* Fig. 46). To this condition, the name *adenomatous endometritis* or benign adenoma of the uterus has also been given (*v.* page 124).

In interstitial endometritis, the connective tissue becomes infiltrated with numerous small round cells, and is greatly thickened —*fungous endometritis*. The capillaries are dilated, and some are ruptured. In a later stage spindle-cells appear in the endometrium, and, as a result, the glands are so pressed upon that they atrophy, and in the end almost or entirely disappear, a final condition which is known as *atrophic endometritis* (*v.* Fig. 47).

In the mixed form, hypertrophy and hyperplasia of the glands occur, accompanied by a round-celled infiltration of the connective tissue. In a later stage, as the infiltration increases, the glands become atrophied and finally disappear.

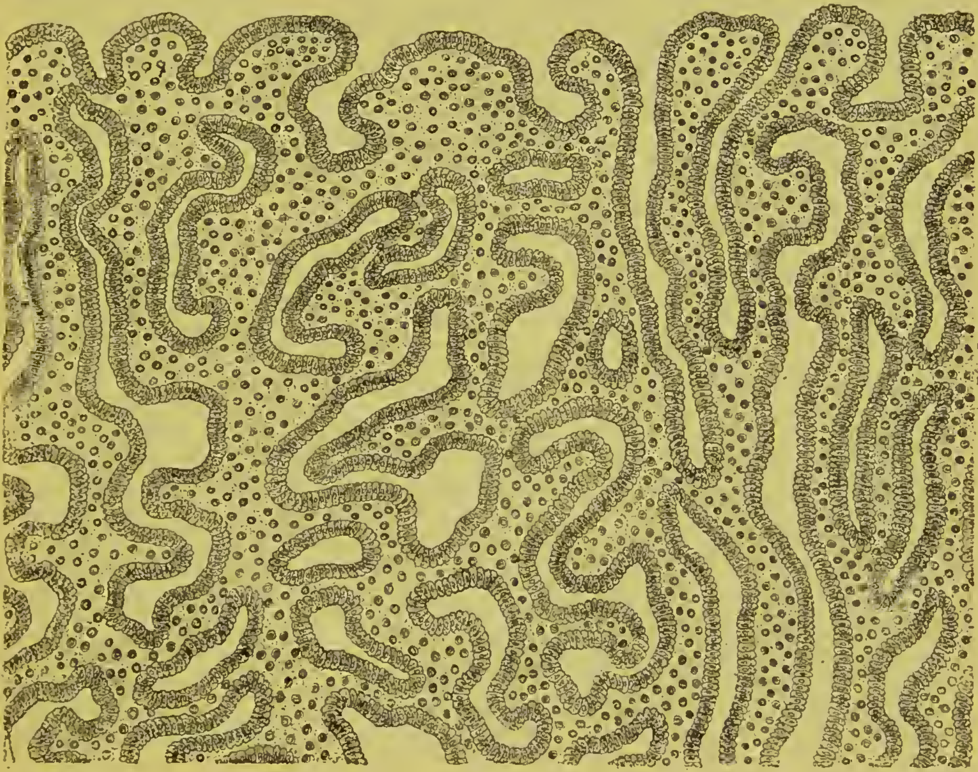


Fig. 46.—Glandular endometritis. Section at right angles to surface of endometrium. Slightly enlarged. (*Wyder.*)

In the hæmorrhagic form, the capillaries are the principal tissue which is affected. They are dilated, increased in number, and their walls become extremely thinned. The result is that, in an advanced case, the endometrium comes to resemble cavernous tissue, and in places the dilated capillaries give way and so cause hæmorrhage (Pilliet).

Symptoms.—The symptoms of endometritis must be divided into those which are due to the local condition, and into those which are due to accompanying constitutional disturbances.

(A) **Local Symptoms.**—The local or uterine symptoms consist in menstrual disturbances of various kinds, in the occurrence of leucorrhœal discharge, and in the general pelvic discomfort and pain associated with the enlargement of the uterus and the retro-deviation which are also so commonly present. The menstrual disturbances consist most usually in the occurrence of menorrhagia, and sometimes metrorrhagia, especially in cases of fungous (*i. e.* the early stages of interstitial endometritis) and hæmorrhagic endometritis. More rarely, scanty menstruation or amenorrhœa is met with. This, as a rule, only occurs in cases in which previous menorrhagia has reduced the patient to a condition of profound anæmia, or in cases of atrophic endometritis (*i. e.* the last stage of interstitial endometritis). In some cases,

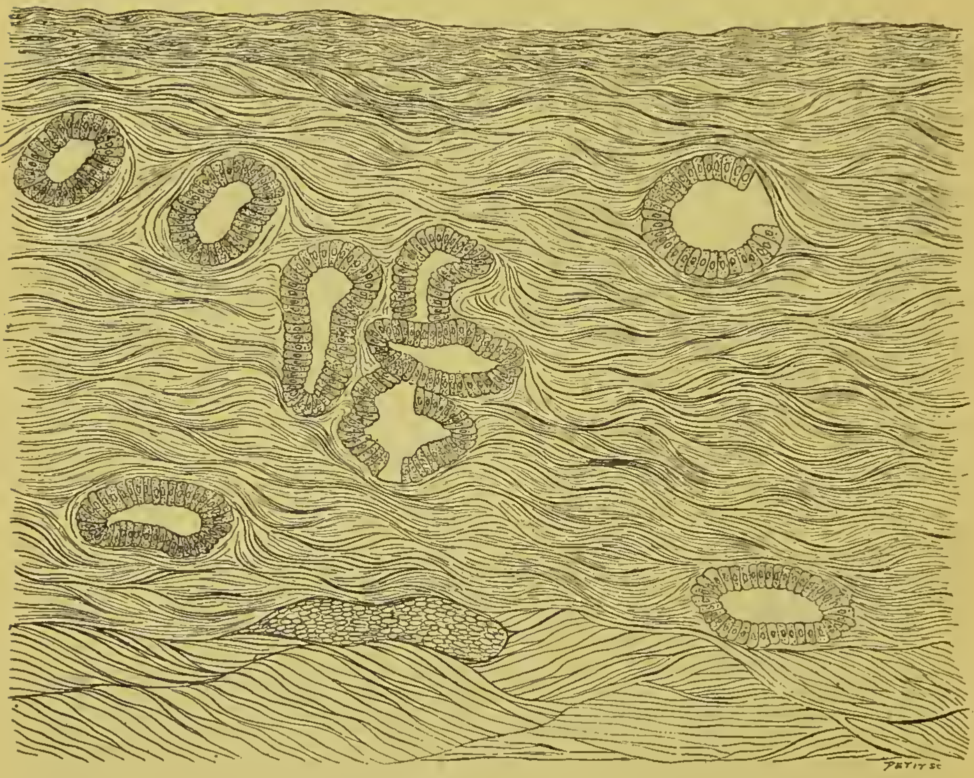


FIG. 47.—Interstitial endometritis. Partial atrophy of the uterine glands. (*Wyder.*)

portions of detached endometrium are expelled at the menstrual periods, or even entire casts of the inside of the uterus. This latter constitutes the so-called *exfoliative endometritis* (*v.* page 23).

Leucorrhœa (λευκός, white; ῥέω, I flow) is usually present in all varieties, but it is especially profuse in the glandular form. In the other forms, the source of the discharge is most probably the cervical glands, which are involved in an accompanying endocervicitis.

Pain in varying degree is a very common symptom. It comes and goes, being rendered worse in its frequency of onset and its severity by prolonged standing or walking, or over-exertion of any kind. It is referred to the iliac fossæ, the back especially the lumbar region, and the perinæum. Frequently, it occurs as dysmenorrhœa, especially in exfoliative endometritis (*v.* page 23).

General pelvic discomfort is caused by the increase in size of the uterus and the frequent presence of displacements. It consists in a feeling of weight and fulness in the pelvis, and a "bearing-down" sensation.

Lastly, sterility is often the result of chronic endometritis, and is due either to the diseased endometrium offering an unsuitable nidus for the reception of the ovum, or to the pathological secretion of the uterine and cervical glands proving fatal to the spermatozoa.

On examination of the patient, the uterus is found to be somewhat enlarged, especially in glandular and hæmorrhagic endometritis, and the size and length of the cavity are increased. The consistency of the uterus may be much softer than normal, or on the other hand it may be much firmer. The latter condition is especially met with in cases associated with very chronic myometritis. The uterus is usually more tender than normal, in proportion to the acuteness of the case. Its mobility is not affected, unless the condition is accompanied by the presence of pelvic adhesions or parametritis. Its position is not necessarily altered, but in many cases retro-deviations are present, owing to the increase in size of the uterus and the relaxation of the ligaments. The cervix is very commonly hypertrophied, and there may or may not be an erosion.

(B) **General Symptoms.**—The general constitutional symptoms, arising as the result of chronic endometritis, vary greatly in different subjects. They consist in the occurrence of permanent or fugitive ill-defined pains, dyspepsia, cardiac palpitations, neuralgias, migraine, and symptoms of rectal and vesical irritation. Anæmia is often present in those forms which are associated with menorrhagia and metrorrhagia. In some cases, symptoms are observed at intervals arising from the absorption of bacterial products from the uterus (Doléris), and consisting of shivering, vomiting, debility, and slight jaundice.

Treatment.—The satisfactory and complete cure of chronic endometritis is often a very difficult matter. The rational treatment, and the only one which gives any good results in very chronic cases, consists in :—

(1) The removal or cure of any condition which tends to keep the uterus in a state of congestion.
(2) The removal of the diseased endometrium.
(3) The adoption of such measures as will ensure the growth of a healthy endometrium.

(1) The measures directed towards the removal or cure of those conditions which tend to keep up the congestion of the uterus consist in :—the correction of displacements ; the stretching or breaking down of adhesions ; the removal of tumours of the adnexa or of the uterus ; the relief of chronic constipation ; the prevention of too frequent coitus, or of coitus at all in some cases ; and the cure of cervical lacerations, or erosions, by trachelorrhaphy, amputation of the cervix, or the application of caustics.

(2) The removal of the diseased endometrium is best and most quickly brought about by the curetting of the uterus, followed by the injection of caustics (*v.* page 325). In some instances, it may be thought preferable to trust to the injection of caustics alone ; but, except in mild cases, the relief which this proceeding affords is not as rapid or as complete as is that afforded by curetting. The caustic, which is most usually injected after curretting in these cases, is one of the following :—Chloride of zinc (50 per cent.), iodised phenol (iodine 1, liq. carbolic acid 3), tincture of iodine, or liquid carbolic acid. The first three are injected by means of a Braun's syringe (*v.* Fig. 48) ; the last is best applied by means of a sound wrapped round with cotton wool.

In mild cases of endometritis, it is sometimes found sufficient to apply astringents, or mildly caustic solutions, to the endometrium by means of Bandl's hollow sound (*v.* Fig. 49). This instrument is used as follows :—The vagina is well douched, and a cylindrical speculum of the largest size which can be introduced is passed into the vagina, and rotated until the cervix projects into its upper orifice. The anterior lip is then caught in an American forceps, and the hollow sound is passed into the uterus. The speculum is filled with the solution which it is proposed to use, and the latter is carried into the uterus by partially withdrawing and again pushing up the sound several times. The solutions generally used for this purpose are pyroligneous acid, sulphate of copper (40 grs. to the ounce), nitrate of silver (20 to 30 grs. to the ounce), and chloride of zinc (40 grs. to the ounce.) In cases due to gonorrhœal infection, a piece of gauze soaked in a two and a half to a five per cent. solution of protargol may be passed into the uterus, and allowed to remain there for twenty-four to forty-eight hours, and this procedure repeated several times.

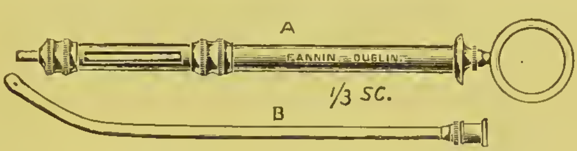


FIG. 48.—Braun's syringe for injecting fluids into the uterine cavity. A, syringe; B, nozzle.

In true hæmorrhagic endometritis, curetting and the application of caustics may be tried, but it is usually found necessary to extirpate the uterus in order to check the hæmorrhage. The intra-uterine injection of steam (Pincus) has been sometimes found of use in these cases (*v.* page 327).

FIG. 49.—Bandl's hollow sound for introducing fluids into the uterine cavity.

(3) As has been mentioned, curetting is the best and most rapid method of removing diseased endometrium, but the treatment of the case cannot be considered as finished once this operation is performed. It, alone, is rarely sufficient to effect a cure, for in addition to the removal of the diseased endometrium, it is necessary to ensure as far as possible the growth of a

Repeat astringent applications 3 or more times.

healthy endometrium. To obtain this result, it is usually necessary that the new endometrium should be again in part, or entirely, removed by the application of mild caustics. In long-standing cases of chronic endometritis the application of some of the above-mentioned drugs by means of Bandl's sound is necessary. The first application may be made a fortnight or so after the curetting, and repeated some three or more times, according to the nature of the case, at intervals of a week or a fortnight.

CERVICAL METRITIS.

Cervical metritis, like corporeal metritis, may occur under two forms:—

I. Acute cervical metritis.
II. Chronic cervical metritis.

I. ACUTE CERVICAL METRITIS.—Acute cervical metritis is a very rare condition, except in association with acute corporeal metritis. Occasionally, however, it occurs by itself.

Ætiology.—The ætiology of acute cervical metritis is practically the same as the ætiology of the acute form of corporeal metritis. Gonorrhœa is perhaps its commonest cause, in those cases in which the cervix alone is attacked. In those cases due to the invasion of septic micro-organisms, the entire uterus is usually affected. Septic infection most commonly occurs after parturition, or more rarely after gynæcological operations.

Pathology.—The cervix is enlarged, œdematous, injected, the external os patulous, and the cervical canal slightly everted. If the inflamed surface is rubbed with the finger, slight bleeding occurs. In the septic form, there is usually a pseudo-membranous grey exudation covering the abraded areas. There is also a profuse, sometimes fœtid discharge. The same changes are found in the glands and interstitial tissue, as in the corporeal form.

Symptoms.—If the uterus is infected as well, the symptoms caused by the cervical condition will be obscured by those caused by the uterine condition. If the cervix alone is affected, the symptoms will be the same as those caused by an acute vaginitis (*v.* page 45).

Complications.—The danger of acute cervical metritis is that the infection may extend to the uterine cavity, and so set up an acute corporeal metritis with its possible train of resulting complications.

Treatment.—The treatment of these cases, if complicated by acute vaginitis or corporeal metritis, will be the same as that of the complication. If it exists alone, it is treated by rest in bed and by the use of warm vaginal douches, insufflation of iodoform on the cervix, and the tamponing of the vagina with iodoform gauze or with plugs of cotton wool soaked in glycerine and ichthyol, and of the cervix with gauze soaked in a two and a half to five per cent. solution of protargol.

II. CHRONIC CERVICAL METRITIS.—Chronic cervical metritis most usually attacks all the tissues of the cervix. As a rule, the glandular and interstitial structures of the mucous membrane are the parts most involved, hence the condition is commonly known as *endocervicitis* (ἔνδον, within; *cervix*, the neck).

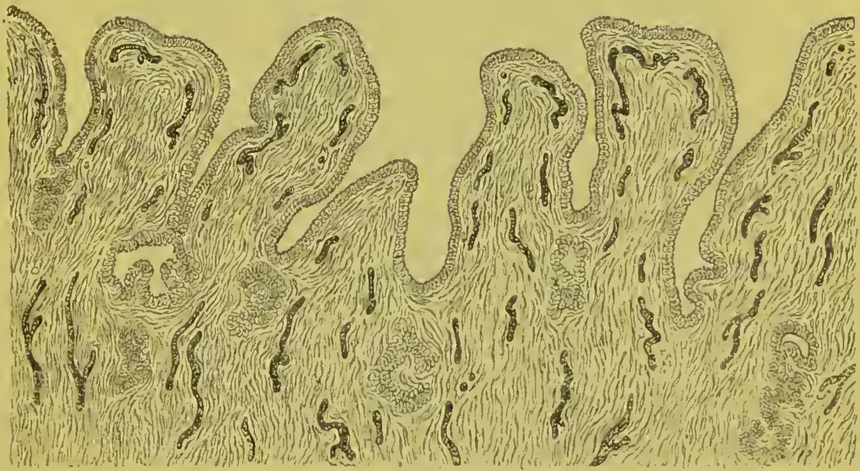


FIG. 50.—Section of the normal mucous membrane of the cervix. Slightly enlarged. (*Wyder.*)

Ætiology.—The causes of endocervicitis are very much the Bot same as those of endometritis, with which it is most usually com associated, either as an antecedent condition or as a consequence.

Pathology.—The cervix is hypertrophied, somewhat œdematous, and its lips everted. Under the microscope, the same changes are seen as in endometritis, with the exception that there is a greater tendency to the formation of retention cysts— VB *Nabothian follicles*—owing to the mouths of the glands becoming obstructed. In some cases, these follicles by their weight force their way through the layer of cervical tissue that separates them from the surface, outside the cervical tissue, to which they remain attached by a pedicle, so forming a mucous polypus. So-called *erosions* of the cervix situated on the mucous membrane below the os externum are also very frequently present (*v.* Fig. 51). The name given to this condition gives a very false idea of the anatomical changes present in the majority of cases. It is not an erosion—in the true meaning of that term—but a change in the nature of the tissues, due to their hypertrophy and hyperplasia rather than to ulceration. As a result of the continual irritation of the portion of cervix below

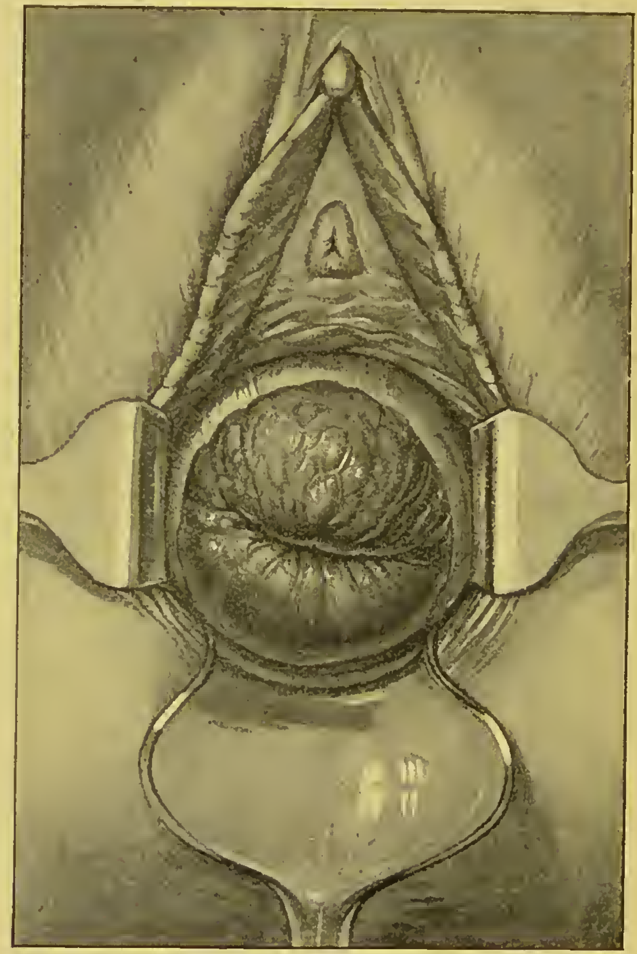


Fig. 51.—The so-called "erosion" of the cervix. (After *Kelly.*)

the os externum, by discharge constantly flowing over it, the squamous epithelium, which normally covers it, is shed, and its place is taken by a downgrowth of the cubical epithelium which lines the cervical glands. At the same time, these cervical glands proliferate, and, extending downwards, are found opening on to the altered patch of cervical mucous membrane. As seen under the microscope, the altered tissue closely resembles the structure of an adenoma, and consequently the condition is sometimes described as an adenoma of the cervix. If the glands pass inwards perpendicularly to the surface of the cervix, they intercept small portions of tissue between their mouths, and under the microscope a papillomatous appearance is the result—*papillary erosion* (*v.* Fig. 52, *a*, *b*). If the mouths of several of the glands become obstructed, leading to the formation of numerous small retention cysts, the condition is known as a

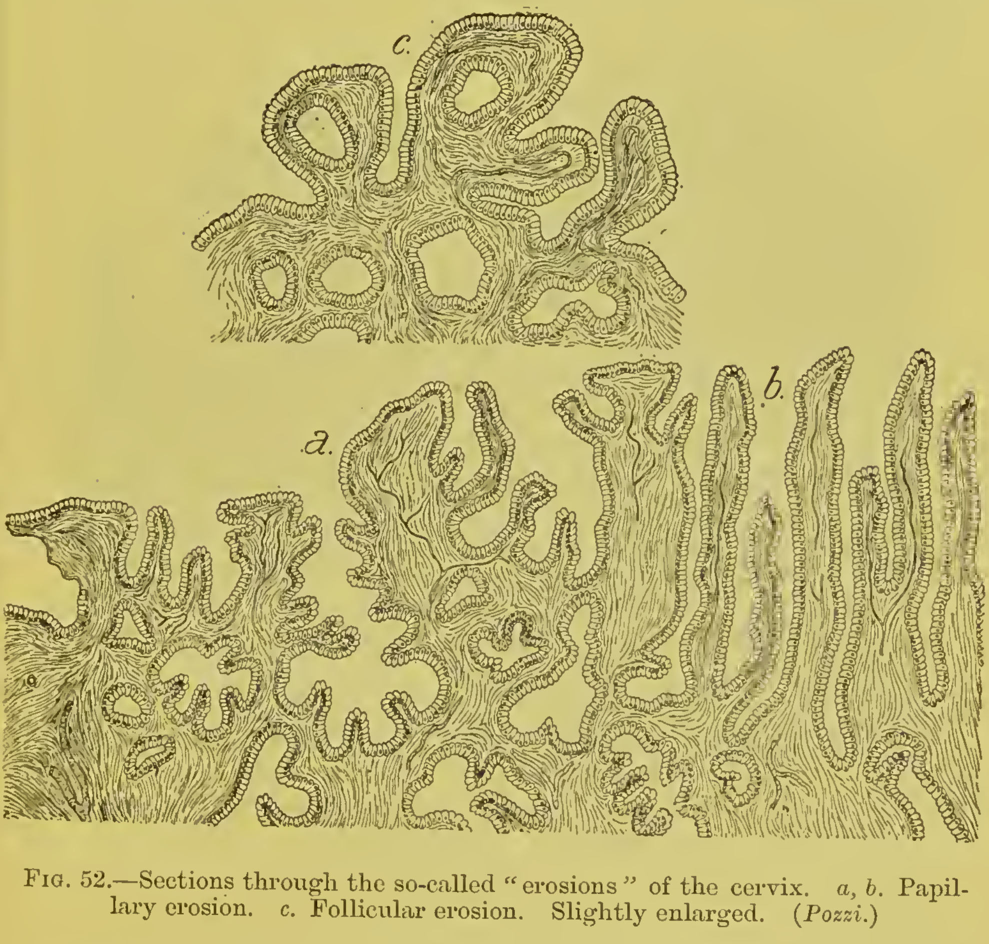


Fig. 52.—Sections through the so-called "erosions" of the cervix. *a*, *b*. Papillary erosion. *c*. Follicular erosion. Slightly enlarged. (*Pozzi.*)

follicular erosion (*v.* Fig. 52, *c*). When the formation of follicles is associated with a marked hypertrophy of the cervical tissue, the condition known as Virchow's *follicular hypertrophy of the cervix* results. In these cases, the growth thus formed may be so large as to reach to the vulvar orifice. Occasionally, in very chronic cases, the layer of cubical epithelium which covers the so-called erosion is destroyed, and thus a true erosion or ulceration occurs (Dührssen). Such a condition is commonly met with in cases of long-standing prolapse of the cervix. A mucous polypus resembles, in its microscopical appearance, the tissue found in an erosion, save that the glands are more dilated, and even in some cases are altered into cystic cavities (*v.* Fig. 53).

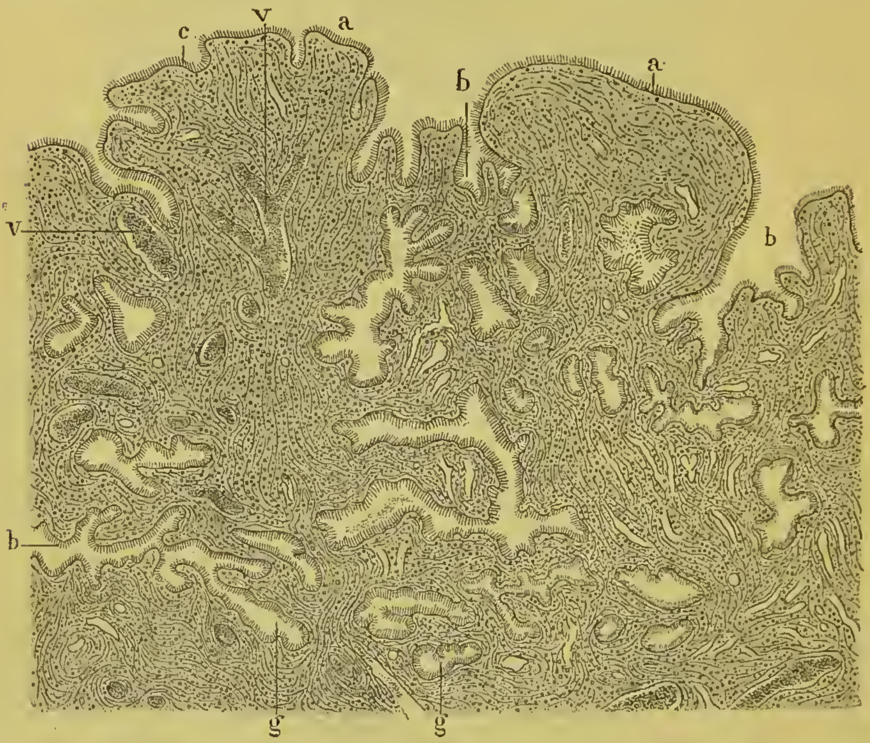


Fig. 53.—Glandular, or mucous, polypus of the cervix. Section enlarged abou 60 diameters. *a, a.* Superficial elevations on surface of polypus, covered by cylindrical epithelium. *b.* Depression between elevations, into which glands are opening. *g.* Deeper portions of glands. *v, v.* Blood-vessels. (*Cornil.*)

Ectropion of the cervix, which is a very common cause of endocervicitis, is frequently confounded with erosion. Ectropion is the term applied to the exposure of the cervical canal which results from deep laceration of the cervix (*v.* Fig. 91). Its appearance closely resembles that of an erosion, as in both the termination of the cervix is composed of tissue which should normally cease at the os externum. In erosion, however, there is an actual new formation of such tissue, while in ectropion it is only the exposure of already existing tissue.

Symptoms.—The cervix is enlarged and gaping, and a thick purulent or muco-purulent discharge issues from it. A papillary erosion imparts a curious velvety sensation to the fingers; a follicular erosion gives a sensation as if small grains of shot lay beneath the mucous membrane. If any of the follicles have become pedunculated, they may be felt protruding from the os. An ectropion is distinguished from an erosion by seizing the lips of the cervix in a bullet forceps, and bringing them together in such a manner as to restore the original shape. If the condition is one of ectropion, the inflamed cervical lining will disappear. If, however, it is an erosion, there will still be the altered patch of mucous membrane visible. The subjective symptoms are the same as those of endometritis, with the exception of menstrual disturbances, but as a rule there is a more profuse leucorrhœa.

men

Treatment.—This consists in the cure of accompanying endometritis and vaginitis, in the removal of erosions, in the suture of cervical lacerations, and in the curetting and cauterisation of the cervical canal. It is sometimes thought advisable to attempt to cure erosions by means of the frequent application of caustics, but this is a most tedious process, as will be easily understood if the nature of the pathological change is taken into account. In some cases, erosion and ectropion will get well of themselves after a long time, a result which is brought about by the gradual atrophy of the glands, and the accompanying ingrowth of the compound squamous epithelium over the denuded area. In all cases of large erosions or great hypertrophy of the cervix, a much more rapid cure will be obtained by amputation of the cervix by Simon-Marckwald's method (*v.* page 313), or by excision of the cervical mucous membrane by Schroeder's method. While, in the case of extensive lacerations, trachelorrhaphy by Emmet's or Sänger's method is the most suitable form of treatment (*v.* pages 314, 316).

CHAPTER IX.

DISEASES OF THE UTERUS (*continued*).

New Growths of the Uterus.—Myomata; Ætiology, Pathological Anatomy, Secondary Changes, Symptoms, Diagnosis, Prognosis, Treatment—Malignant Neoplasms; Carcinoma of the Body; Pathological Anatomy, Symptoms, Diagnosis, Prognosis, Treatment: Carcinoma of the Cervix; Pathological Anatomy, Symptoms, Prognosis, Treatment: Sarcoma; Varieties, Pathological Anatomy, Symptoms, Diagnosis, Prognosis, Treatment: Deciduoma Malignum; Ætiology, Pathological Anatomy, Symptoms, Diagnosis, Treatment—Tuberculosis of the Uterus; Varieties, Diagnosis, Treatment.

NEW GROWTHS OF THE UTERUS.

The benign neoplasms which are met with in the uterus are as follows:—

(1) Fibro-myomata.
(2) Adenomata. = Glandular endometritis
(3) Fibro-adenomata or adeno-fibromyomata.

Fibro-myomata are so important as to require a section to themselves. Adenomata have been already described under glandular endometritis (*v.* page 112). It is very questionable whether this condition should be considered as a neoplasm, and not as being merely the result of inflammatory changes. For this reason, the author prefers to discuss it under the head of metritis.

Fibro-adenomata, or adeno-fibromyomata as they are more correctly called, occur when glandular development takes place in a fibro-myoma. The origin of the glandular tissue may be either pre-existing uterine glands which have made their way into the interior of a fibro-myoma (Legien), or the remains of aberrant portions of the Wolffian bodies (Recklinghausen).

Fibro-myomata.

Fibro-myomata, or myomata (μῦς, a muscle), or uterine fibroids, as they are variously called, are the most important of the benign uterine neoplasms.

Ætiology.—Two theories have been suggested as the cause of myomata:—

(1) That they are the result of irritation.

(2) That they are the result of some congenital error.

(1) The first theory, which was originally suggested by Virchow, is the one more generally adopted. It is believed, that, under the influence of some irritant, myomata start in the external coat, or *tunica adventitia*, of the uterine capillaries or small arteries (Gottschalk). What the nature of the primary irritant is, has not been determined. Some authorities suggest that it may be microbic infection. Myomata, as a rule, rarely start in women who have had children, and it may be that their development is due to the fact that, owing to the non-occurrence of pregnancy, the cells in the walls of the blood-vessels undergo an abnormal hyperplasia as a result of being deprived of the normal hyperplasia which would be the result of pregnancy.

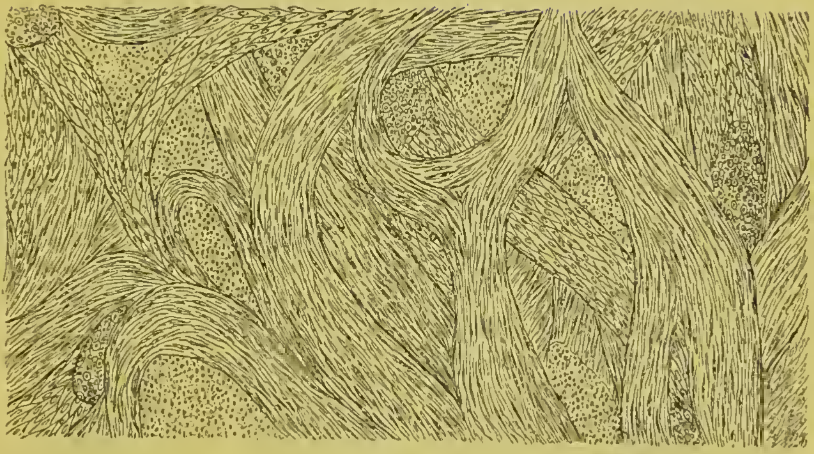


FIG. 54.—Fibro-myoma of the uterus. Microscopical section. (*Pozzi.*)

(2) The second theory, that myomata are the result of some congenital error of development, was started by Cohnheim, and

has been upheld by Leopold. It has not received very much support, owing to the general lack of evidence in its favour.

Pathological Anatomy.—A uterine fibro-myoma is composed

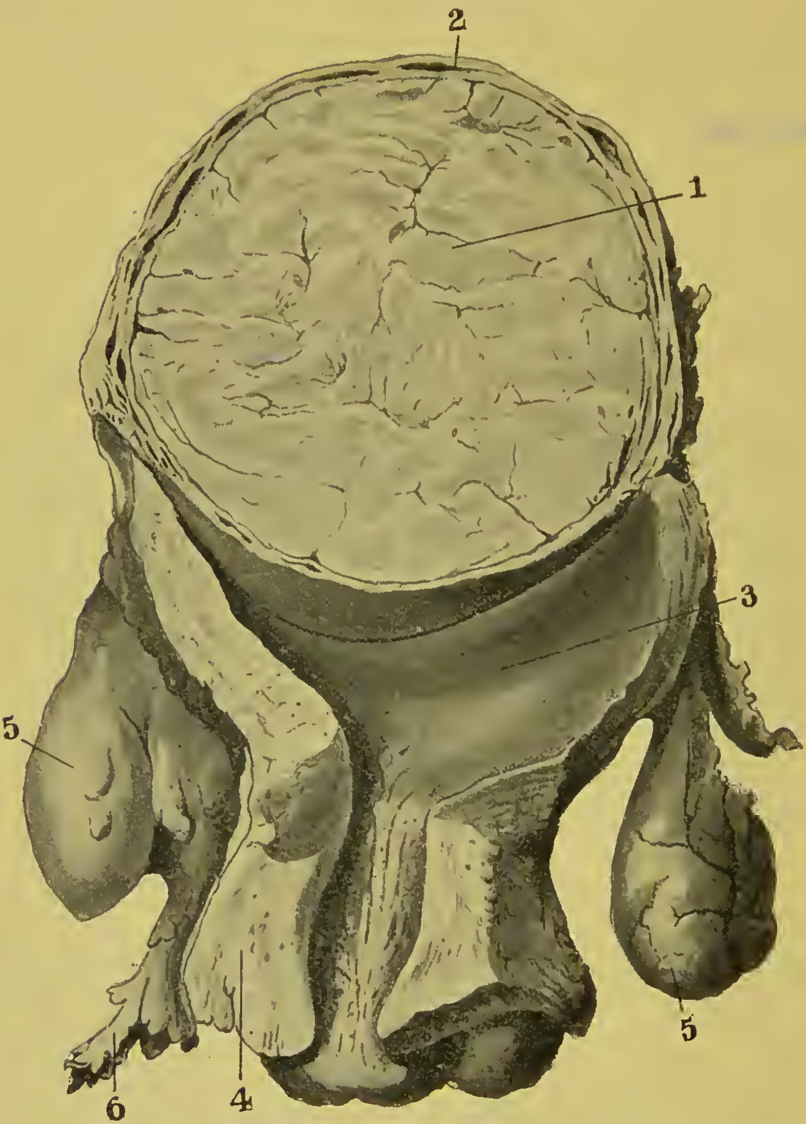


FIG. 55.—Section through an interstitial myoma, springing from the fundus. 1. Main mass of the myoma. 2. Capsule formed by thinned-out uterine wall and peritoneum, and containing dilated veins. 3. Cavity of uterus. 4. Cervix. 5, 5. Enlarged and œdematous ovaries. 6. Fallopian tube. (*Roberts.*)

of both unstriped muscle cells and fibrous tissue (*v.* Fig. 54). In some tumours the fibrous tissue predominates, in others the muscular. Myomata are more or less circular in form, and on section present a concentrically laminated appearance, and vary in size from that of a pea to that of a nine months' pregnancy (*v.* Fig. 55). They are usually multiple, and tend to grow in one of the following ways (*v.* Fig. 56) :—

(1) Inwards into the uterine cavity,—submucous myoma.

(2) Outwards into the abdominal cavity,—subserous or subperitoneal myoma.

(3) Between the layers of the uterine wall, so that there is always a covering of normal uterine tissue between the myoma and the surface,—interstitial myoma.

Either a submucous or subperitoneal myoma may become pedunculated.

Secondary Changes.—The following changes may take place in myomata. Some of them may be regarded as nature's attempt to remove the tumour and so are beneficial, whilst others are quite the reverse :—

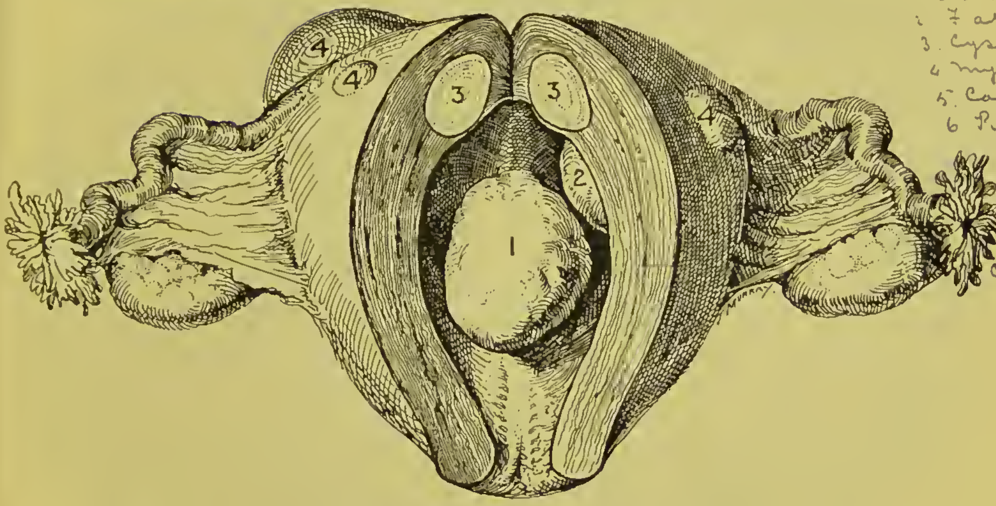


FIG. 56.—Uterus showing the various positions in which myomata may develop. 1. Pedunculated submucous myoma. 2. Sessile submucous myoma. 3. Interstitial myoma. 4. Subperitoneal myomata. (From a specimen in the possession of Dr. H. C. Earl).

1 Fibrous
2 Fatty
3. Cystic
4 Myxoma
5. Calcareo
6 Putrefac
Suppu
7. Sarc
or
Carcino

(1) Fibrous degeneration. This change implies an increase in the fibrous tissue of the myoma at the expense of the muscular tissue. As a result, the tumour becomes very much harder than before, and its blood-supply is diminished. On this account, there is less tendency to menorrhagia and metrorrhagia, and consequently it is a beneficial change.

(2) Fatty degeneration. This change occurs as the consequence of a deprivation of blood, and results in the marked diminution and sometimes the entire disappearance of the tumour. It most frequently occurs after parturition, and, if the uterine cavity is infected, there is considerable danger of sloughing of the myoma in consequence of the diminished blood-supply.

(3) Cystic degeneration. In some cases, owing to various changes, the tumour becomes cystic, and is then known as a fibro-cystic tumour of the uterus (*v.* Fig. 57). This change may be brought about as follows:—

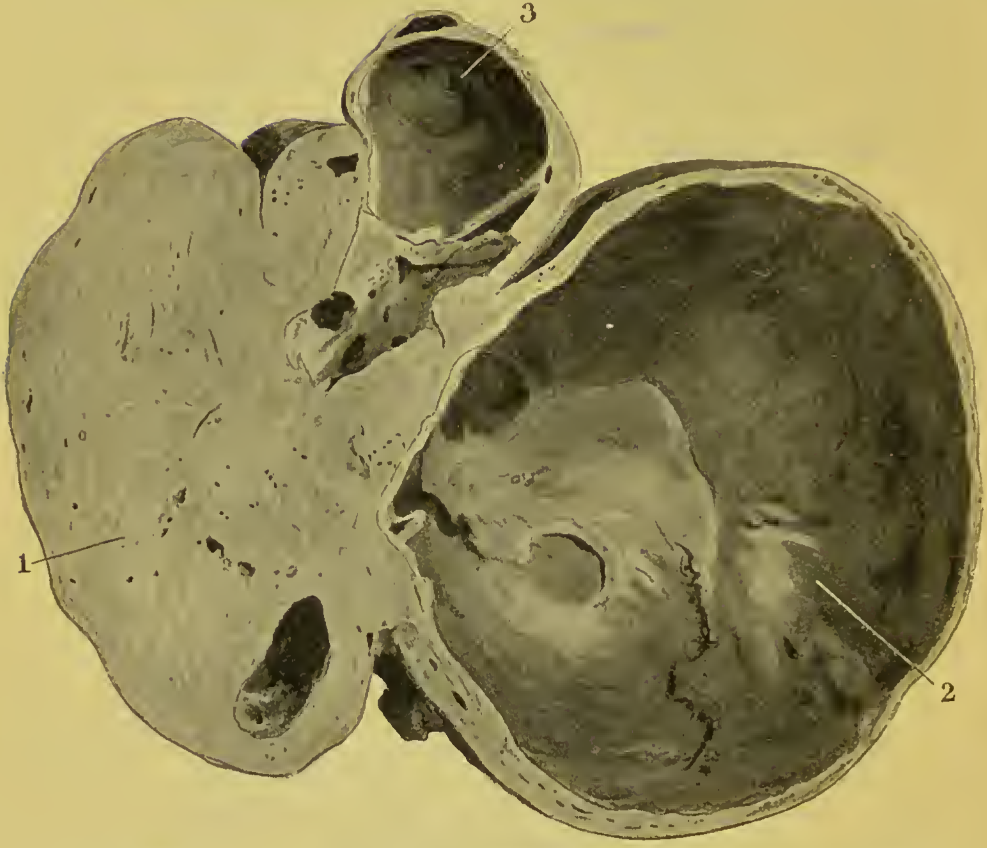


Fig. 57.—Fibro-cystic tumour of the uterus. 1. Solid portion of the tumour, showing a few cystic spaces. 2. Large cystic cavity, measuring seven inches in diameter; it has no distinct lining membrane; its outer surface is covered with peritoneum. 3. Another cystic cavity of a similar nature. (*Roberts.*)

(*a*) The tumour may undergo a myxomatous degeneration, which results in the formation of numerous small dilatations between the bundles of muscle-fibres. These dilatations are filled with a mucin-containing fluid, and gradually tend to get larger as more of the surrounding tissue breaks down. Finally, one or more large cavities are formed, which occupy almost the entire interior of the myoma.

(*b*) The lymph channels of the tumour may dilate, resulting in the formation of cavities lined with endothelium, and filled with lymph.

(*c*) There may be present in the uterine wall the remains of the Wolffian body (Recklinghausen), or invaginations of the uterine glands, which have been dragged downwards into the myoma in the course of its growth (Legieu), and these may become cystic. In such cases the resultant cavities are lined with epithelium.

(*d*) Myomata which have undergone sarcomatous degeneration may become cystic in the centre, as a result of necrosis from diminished blood-supply.

(4) Myxomatous degeneration. This has been referred to under cystic degeneration.

(5) Calcareous degeneration. This change consists in the deposit of lime salts in the tumour. Most usually, they are first deposited in the centre and travel outwards concentrically; more rarely, the salts are deposited at first in the capsule. If the myoma which becomes so affected is pedunculated, it may become detached and set free in the abdominal cavity, in the case of a subserous myoma; in the uterine cavity, in the case of a submucous myoma. In the case from which the drawing was made, the calcified myoma ulcerated through the bladder wall (*v.* Fig. 58). Part of the calcified portion broke off, and falling into the bladder led to the diagnosis of calculus of the bladder—the uterine condition being overlooked.

(6) In some cases the vessels of the myoma undergo a marked increase in number and size, so that the structure of the tumour resembles that of a sponge. Those tumours are known as *cavernous or telangiectatic myomata* (Virchow).

(7) Putrefaction. Putrefaction or suppuration results, if saprophytic or septic organisms invade a myoma which has been to a great extent or altogether deprived of its blood-supply. Such an accident is most likely to occur after parturition.

(8) Malignant degeneration. Sarcomatous degeneration is not of very uncommon occurrence, and is a possibility which must be borne in mind when discussing the advisability of operative interference. It is a change which takes place very insidiously, and, when it is diagnosed, it is usually too late to

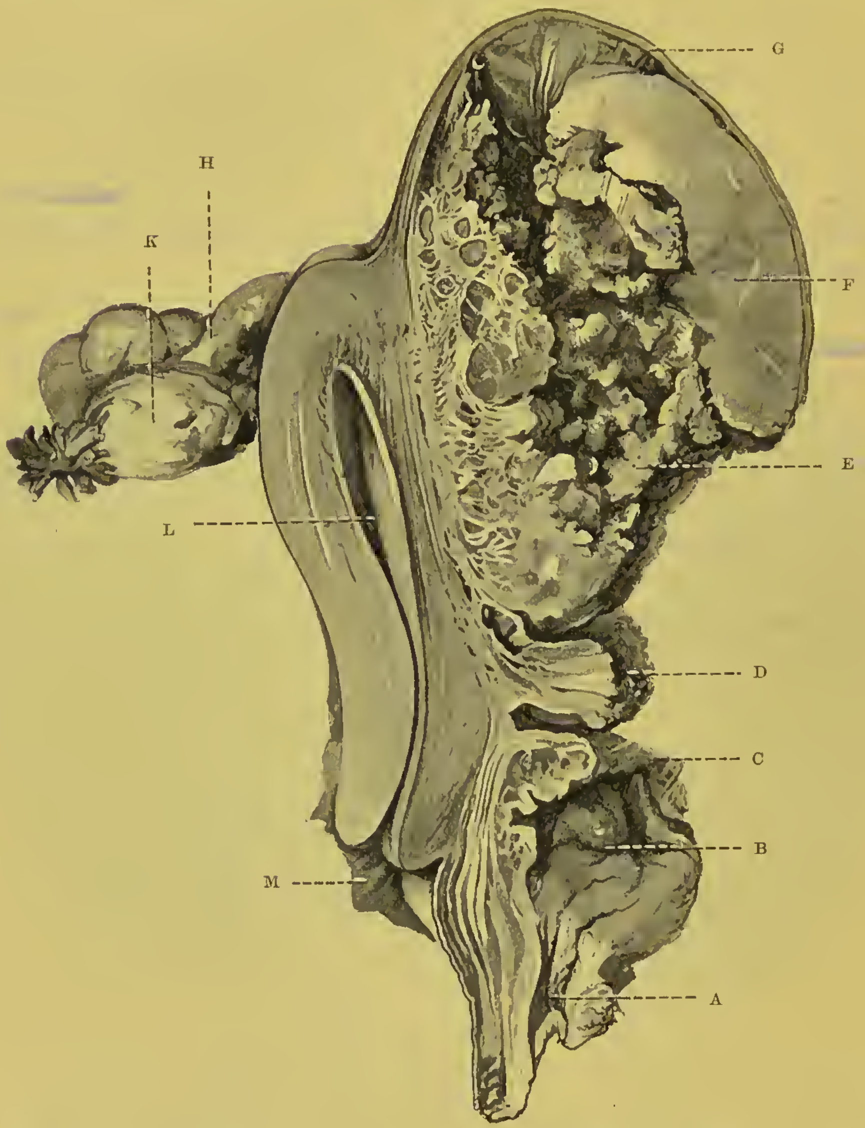


Fig. 58.—Calcareous degeneration of a sub-peritoneal myoma. A. Urethra. B. Bladder. C. Edge of gap, result of ulceration in bladder-wall. D. Edge of gap in capsule of myoma, also the result of ulceration. E. Calcified masses in centre of myoma. F. Non-calcified remains of myoma. G. Capsule. H. Fallopian tube. K. Ovary. L. Uterine cavity. M. Vagina. (From a specimen in the School of Physic, Trinity College, Dublin.)

completely remove the tumour. Carcinomatous degeneration is very much more rare than sarcomatous, inasmuch as it is probably only in a small proportion of cases that the pre-existing epithelium, which is necessary for the development of the carcinoma, is found in a myoma. In these cases, the starting point of the carcinoma is probably the same as the starting point of fibro-adenoma of the uterus, viz.—the remains of the Wolffian body, or portions of included uterine glands. Secondary involvement of a myoma, by carcinoma starting in the endometrium, is, on the other hand, by no means an uncommon occurrence. A typical example of such a condition is shown in the accompanying drawing (*v.* Fig. 59).

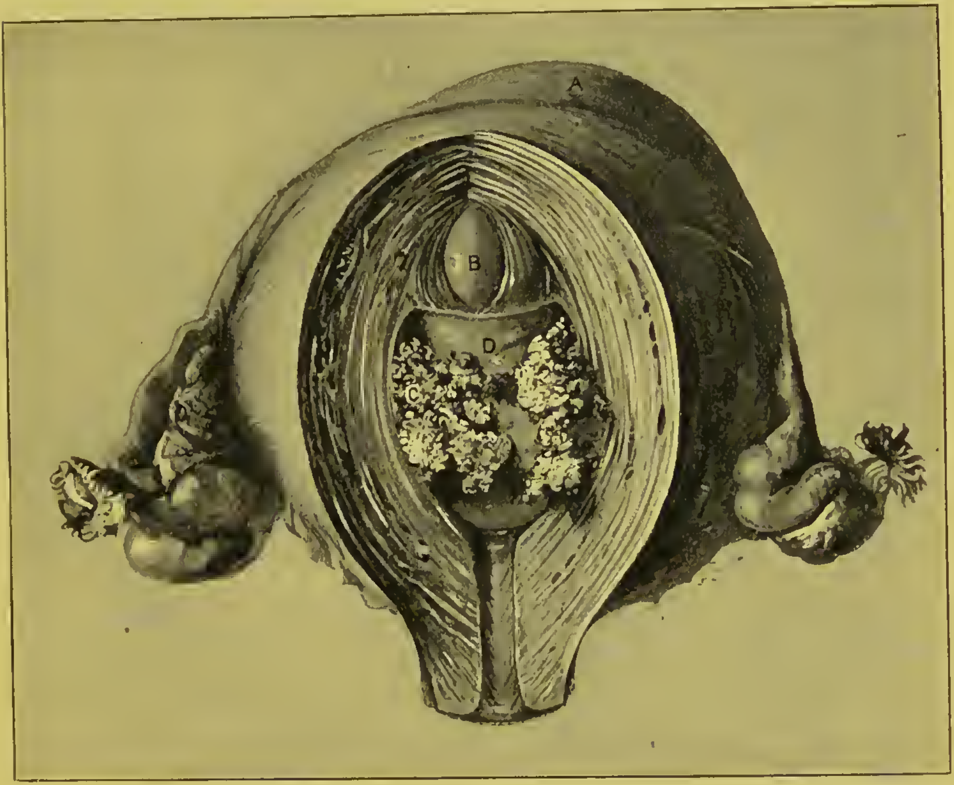


Fig. 59.—Fibro-myoma of the uterus, associated with adeno-carcinoma of the endometrium. A. Large sub-peritoneal myoma, on posterior wall of uterus. B. Interstitial myoma. C. Papillomatous malignant outgrowths springing from, D, posterior wall of uterine cavity. (From a specimen in Pathological Laboratory, Trinity College, Dublin.)

Symptoms.—The symptoms caused by myomata are a varying degree of menorrhagia, metrorrhagia, leucorrhœa, dysmenorrhœa, and pain. Symptoms produced by the pressure of the tumour on the pelvic and abdominal viscera are also usually present.

It will be easily understood that the extent to which these symptoms occur varies very greatly in different cases. Speaking generally, they may be said to depend upon the following points:—

(1) The situation of the tumour, *i. e.* whether it is subperitoneal, interstitial, or submucous.
(2) The condition of the endometrium.
(3) The size of the tumour.
(4) The age of the patient.
(5) The changes which the tumour is undergoing.

(1) *The Situation of the Tumour.*—The situation of the tumour affects to a marked degree the amount of menorrhagia and metrorrhagia—that is the various symptoms of endometritis, leucorrhœa, and dysmenorrhœa—that occur in any case, as these symptoms to a large extent depend on the proximity of the myoma to the endometrium. These symptoms are most marked in submucous myomata, and least marked in pedunculated subperitoneal myomata.

(2) *The Condition of the Endometrium.*—The condition of the endometrium has naturally a marked effect on the amount of hæmorrhage. Endometritis, in some degree, is most usually associated with myomata, and according to the degree present the hæmorrhage is profuse and constant, or slight and occasional as the case may be.

(3) *The Size of the Tumour.*—The size of the tumour also affects the amount of hæmorrhage, unless the entire growth is subperitoneal. In all cases, a myoma causes pressure symptoms in proportion to its size and situation, and, if it should become impacted in the pelvis, these symptoms will be very acute. If the tumour reaches an extreme size, intestinal atony from pressure on the intestines, and cardiac distress and pulmonary dyspnœa from pressure upon the heart and lungs respectively, may result.

(4) *The Age of the Patient.*—All the symptoms of a myoma, except those that are solely due to the size of the tumour, will
* tend to diminish at the onset of the menopause. In some cases, the diminution may be so great that the patient returns

to comparative health, in others the change is not so marked. All the symptoms become worse at the onset of and during a menstrual period.

(5) *The Changes which the Tumour is undergoing.*—The changes which the tumour undergoes have in some cases a marked effect upon the nature and amount of the uterine discharges. Thus, in fibrous degeneration, hæmorrhage and leucorrhœa are lessened. In fatty degeneration, hæmorrhage is also lessened, and while at first there is an increase in the leucorrhœa, which will be found to contain fat-drops, after a time this discharge will also be diminished. In malignant degeneration, the discharge is at first profuse, and at intervals there may be severe hæmorrhages. As soon as the malignant growth becomes infected by saprophytic or septic bacteria, the discharge becomes sanious. If the myoma sloughs, there is also a sanious discharge, and, if there is suppuration, pus escapes.

Diagnosis.—The diagnosis of a myoma may be a very simple proceeding, or, on the other hand, it may be a matter of the greatest difficulty; or it may even be impossible, without the aid of an exploratory laparotomy. The main points in making a diagnosis consist in the determination of the following:—

(1) The existence of a tumour usually multinodular, incorporated in or connected with the uterus.

(2) The palpation of both ovaries as bodies separable from the tumour.

(3) The elimination of the possibility of pregnancy as a cause of the uterine enlargement.

(4) In the case of submucous myomata, the projection of a tumour into the interior of the uterus, as determined by the sound or by digital exploration.

(5) The history of the gradual growth of a tumour upwards from the pelvis, accompanied by menstrual disturbances as described above.

In a typical case, on making a bimanual examination, a multinodular tumour will be found, in which the uterus is incorporated, and which moves when the cervix is pulled upon. The ovaries are felt lying alongside the tumour and possibly their connection with it may be determined. The tumour may be freely moveable, or on the other hand it may be firmly fixed as a result of its impaction in the pelvis. In the case of a submucous or interstitial myoma, the uterus may preserve its shape, while at the same time it is enlarged to a varying extent. Such cases are most readily confused with pregnancy, or, if the enlargement is but slight, with chronic corporeal metritis. The diagnosis from pregnancy is made principally by the history of the patient, and by the character of the enlargement. In pregnancy, the uterus is softer, especially the lower uterine segment; the body is more globular; it may be possible to obtain internal ballottement; and, when the sixth month is passed, it is possible to obtain the certain signs of pregnancy, *i. e.* to auscultate the fœtal heart and to palpate the fœtal parts.

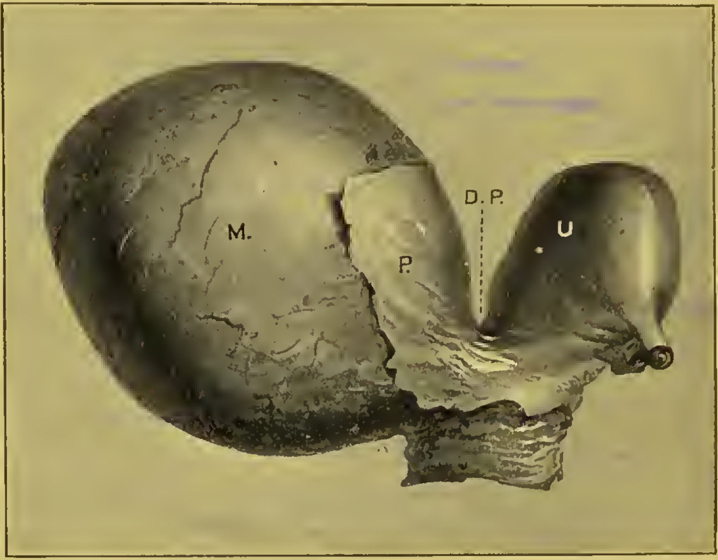


FIG. 60.—A subperitoneal myoma springing from the posterior cervical wall, and lying behind the peritoneum, which forms the posterior wall of Douglas' pouch. U. Uterus. D. P. Douglas' pouch. P. Peritoneum. M. Myoma springing from cervix. (From a specimen in the possession of Dr. Earl.)

A myomatous uterus must also be distinguished from ovarian tumours, enlargements of the Fallopian tubes, extra-uterine pregnancy, a large retro-uterine hæmatocele, splenic and renal tumours, and malignant growths of any abdominal organ, which have extended into the pelvis (*v.* Fig. 60). A myoma such as that shown in the accompanying drawing can be readily mistaken for an ovarian tumour, cystic tubes, or a hæmatocele, in Douglas' pouch, or for the body of an enlarged retroverted uterus.

As well as making the diagnosis of the presence of a myoma, its situation must be determined as accurately as possible, as the question of the proper mode of treatment will to a great extent depend upon this.

Prognosis.—The prognosis, and hence the question of the treatment of myomata, depend upon very much the same conditions as have been already mentioned as influencing the symptoms, *i. e.* the situation and size of the tumour, the age of the patient, and the changes which may take place or are taking place in the former. Myomata may cause death by the continued loss of blood; by the debilitating effect of profuse leucorrhœal discharge; by the pressure they exert upon vital organs; or by forming the starting point of malignant growths. On the other hand, subperitoneal myomata unless they are of large size, or small myomata—wherever situated—which start near the menopause, may as a general rule be considered as comparatively harmless.

Treatment.—The treatment of myomata is somewhat complex, as so much depends upon the nature and circumstances of each individual case. The various measures which are adopted will be best considered under two heads:—

I. Palliative treatment, that is the adoption of measures directed towards the relief of the symptoms and the checking of the growth of the tumour.

II. Radical treatment, that is the removal of the myoma either with, or without, the removal of the uterus.

I. PALLIATIVE TREATMENT.—Measures directed towards the relief of the symptoms and the checking of the growth of the tumour can be divided into the following classes:—

(A) Medicinal measures.
(B) Operative measures.

(A) **Medicinal Measures.**—Medicinal measures consist in the free use of ergot, either hypodermically or by the mouth, or of drugs such as Hydrastis Canadensis and Cannabis Indica. The continued use of ergot was introduced by Hildebrandt, who recommended the injection of ergotin (Ext. Ergotæ, B.P.). He used the small amount of five centigrammes (·78 gr.)

gr 2-8

diluted with four times its weight in water, a dose which may with advantage be increased to two to four grains. Any good preparation of Liquid Extract of Ergot may be used instead, the dose consisting of from twenty to thirty minims at each injection. Ergot will probably tend to check the hæmorrhage and growth of the tumour in some cases, but it is most uncertain and unsatisfactory in its action. The Liquid Extract of Hydrastis Canadensis is administered in doses of from ten to fifteen minims three times a day, and the Tincture of Cannabis Indica is administered in doses of from five to fifteen minims.

(B) **Operative Measures**.—Operative measures consist in the adoption of one or other of the following proceedings:—

(1) Curetting.
(2) Electrolysis.
(3) Oöphorectomy.

(1) *Curetting.*—Curetting was introduced as a remedial agency in myomata by Winckel. It is only of use in order to remove the diseased endometrium, which commonly is present in association with myomata. In this way, it, in some cases, brings about a complete though temporary relief of the symptoms. This relief will be of longer or shorter duration according as the myoma is subserous or in close approximation to the endometrium. In the latter case, the benefit is extremely transitory. Curetting is often of value as a preliminary to a more radical operation, with the object of removing endometrium which may be in a sloughing or otherwise septic condition.

(2) *Electrolysis.*—The use of the continuous electrical current in myomata was first brought prominently forward by Apostoli in 1886. His method consists in subjecting the tumour to the influence of a continuous current, by placing the positive electrode of a battery in the uterus, and the negative electrode upon the abdominal wall over the tumour. The intra-uterine electrode is made in the shape of a sound, in order to facilitate its introduction. The abdominal electrode consists of a large flat pad, in order that there may be a considerable area of contact between it and the skin, as in this way the irritation and pain caused by the passage of the current is diminished. On the first occasion, the current is gradually increased in intensity up

to 50 to 80 milliampères, kept at this degree for five minutes, and then gradually reduced. The treatment is repeated once or twice a week, and the maximum strength of the current gradually increased up to 200 m.a. If the treatment is producing a beneficial effect, it should be persisted in for several months; on the other hand, it is useless to continue it for an unduly long time, if there is no apparent benefit.

Electrolysis, when properly used, has in some cases given temporary benefit, and in patients who are near the menopause, this benefit may last sufficiently long to enable them to reach that period without further dangerous hæmorrhages. In the majority of cases, however, its result is not by any means so good. It is, to say the best of it, an uncertain mode of treatment, and one which should only be adopted in exceptional cases such as in the case of women who are approaching the menopause, who will not submit to a radical operation, or in whom such a proceeding is contra-indicated.

(3) *Oöphorectomy.*—Double oöphorectomy, with the object of hastening the advent of the menopause, was introduced by Battey. It used to be considered as the operation of election in cases of myoma, but, since the perfecting of the technique of hysterectomy, it has fallen into the position of the operation of necessity. That is to say, so far from being considered as the most suitable operation in these cases, it is only adopted if the nature of the tumour, or the condition of the patient, renders hysterectomy impossible. It is coming to be more widely recognised every day that a woman with a uterus and no ovaries suffers more after the operation both mentally, and physically, than a woman who has her ovaries and no uterus. Oöphorectomy will not give satisfactory results in the case of a soft rapidly-growing myoma; on the other hand, it may do so in the case of tolerably firm myomata which are not showing any tendency to rapid growth. Its use should, as a general rule, be limited to such cases as the foregoing, in which the patient is near the menopause, and in which the situation of the tumour renders its complete removal more than ordinarily dangerous, and to those cases in which the debilitated condition of the patient renders her unfit for a prolonged operation.

II. RADICAL TREATMENT.—Operations for the removal of myomata fall under two heads:—

(1) Those involving the removal of both the uterus and the myoma.

(2) Those directed towards the removal of the myoma alone.

(1) Hysterectomy is the operation most frequently performed in the case of large myomata. The different methods of performing it can be tabulated in the following manner:—

- Hysterectomy
  - Ventral
    - Partial.
    - Total.
  - Vaginal
    - Without mutilation of the uterus.
    - With mutilation of the uterus.

The nature of these various operations will be discussed in the proper place (*v.* page 338). For our present purpose, the terms by which they are known will convey sufficient information.

The form of hysterectomy, which is chosen in any particular case, depends upon the size and position of the tumour. Partial ventral hysterectomy is suitable in those cases in which the low situation of the tumour does not prevent the isolation of the cervix. Total ventral hysterectomy rivals the last operation, as the operation of election for large myomata. Whether it is the better operation for all cases or not, it has at all events firmly established its place for those cases in which it is not possible to isolate a cervix suitable for ligation. Further advantages claimed for it are that the cervix is removed, and hence a possible source of infection of the peritoneal cavity done away with, and that there is not the same risk of secondary hæmorrhage that there is after partial hysterectomy. Its disadvantage is that in some cases it takes slightly longer to perform than does the latter operation. Vaginal hysterectomy without mutilation of the uterus—that is without some attempts being made to reduce the size of the uterus, or to render its shape such that it can be extracted through the vagina—is rarely possible in the case of a myomatous uterus. Vaginal hysterectomy with mutilation of the uterus may be performed in the case of small myomata which do not extend above the pelvic brim.

(2) Operations directed towards the removal of the myoma

alone are two in number;—myomectomy, and enucleation. They are so closely related to one another that they may be considered together. Either of them can be performed as an abdominal or as a vaginal operation, and hence they are classified as:—

(*a*) Ventral myomectomy or enucleation.
(*b*) Vaginal myomectomy or enucleation.

(*a*) *Ventral Myomectomy or Enucleation.*—Ventral myomectomy is the most suitable operation in the case of a pedunculated subperitoneal myoma, ventral enucleation in the case of a non-pedunculated subperitoneal or interstitial myoma, which can be removed without permanent injury to the uterus itself. In myomectomy, the pedicle is transfixed, ligated, and divided; in enucleation the capsule of the tumour is incised, the tumour shelled out, and its bed obliterated by sutures or otherwise (*v.* page 370).

Enucleation is certainly the ideal operation for those cases in which the myomata are small and do not involve a large extent of the uterus, as it leaves the latter intact. Its disadvantages are that there is sometimes a difficulty in checking the hæmorrhage which results from the tearing of the capsule, and that the mortality attendant upon it seems to be appreciably higher than after hysterectomy.

(*b*) *Vaginal Myomectomy or Enucleation.*—Vaginal myomectomy or enucleation is always indicated in the case of pedunculated or sessile submucous myomata, and also in the case of such small subperitoneal myomata as can be easily reached from the vagina through the anterior or posterior fornix (*v.* pages 333, 370).

Pedunculated submucous myomata, or "fibrous polypi," which have been expelled from the uterine cavity, are very much the easiest to manage by this method. In their case, it is only necessary to seize the polypus with a strong forceps and to twist it gradually away if the pedicle is thin, or, if the latter is very thick, to divide it with scissors after first ligating it. If there is any difficulty in checking the hæmorrhage, the uterus must be firmly plugged with gauze.

In the case of sessile submucous myomata, or of polypi which have not been expelled from the uterus, the process of removal can be carried out in one of two ways. Either the cervix can be dilated by means of sea-tangle tents and Hegar's dilators (*v.* page 333), or the anterior wall of the uterus may be split—after first separating the bladder as in a vaginal cœliotomy, the tumour enucleated, and the incision sutured. If the tumour is of large size it may be necessary to remove it piecemeal—morcellation (*v.* page 334). In the case of subserous myomata which are attacked through the vagina, the anterior or posterior fornix is opened—according as the tumour is growing from the anterior or posterior wall of the uterus, the capsule of the myoma is incised, the myoma itself enucleated, and the cavity sewn up.

MALIGNANT NEOPLASMS.

The malignant neoplasms, which are met with in the uterus, are as follows :—

I. Carcinoma.
II. Sarcoma.
III. Deciduoma malignum.

CARCINOMA UTERI.

Cylindrical-celled cancer or adeno-carcinoma may start in the uterine or in the cervical glands. Squamous-celled cancer can only arise outside the os externum, that is in that portion of the cervix which is covered with compound squamous epithelium. We shall discuss cancer of the body and of the cervix separately.

CANCER OF THE BODY.—Cancer of the body is always cylindrical-celled, save in the exceptional cases in which it is secondary to a pre-existing growth in the cervix. It is a comparatively rare disease, and occurs most usually in women between fifty and sixty, and more frequently in nulliparous than in parous women.

Pathological Anatomy.—The growth starts from the cylindrical epithelium of the uterine glands, and is in fact an adeno-carcinoma. It then continues to develop in one of two ways ;—as a circumscribed growth, or as a diffuse growth. The circumscribed form is the rarer of the two. In it, a tumour—sessile or slightly pedunculated—is found springing from some portion of the uterine wall, while the remainder of the mucous membrane is quite unaffected. In the diffuse form the malignant disease involves the greater part of, or the entire, endometrium, and then spreads outwards into the muscular coat (*v.* Fig. 61.) As the growth of the disease continues, the entire body of the uterus becomes affected, but so far as is at present known extension never takes place into the cervix, doubtless due to the fact that the lymph stream flows from the cervix NB ! in the direction of the body. Extension takes place into the broad ligaments, and subperitoneally all round the uterus; and,

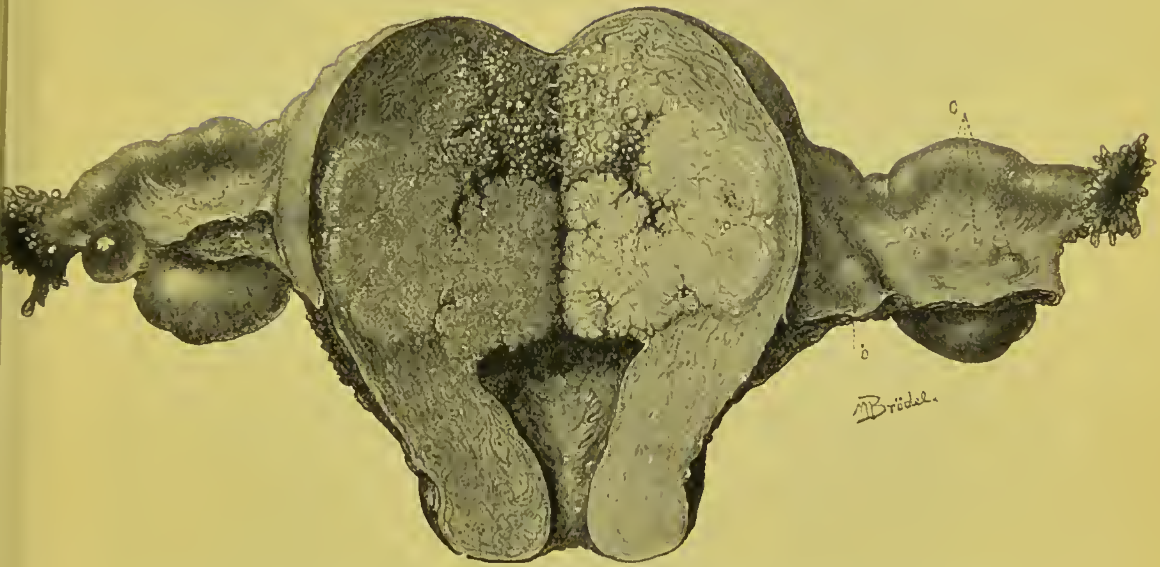


FIG. 61.—Adeno-carcinoma of body of uterus. *b.* Nodule in left round ligament. *c.* Three small nodules in lymph channels of left broad ligament. (*Cullen.*)

finally, any of the neighbouring organs may be involved, and metastases may occur in the lungs and liver.

* *Symptoms.*—The earliest symptom of cancer of the body of the uterus is the occurrence of a watery blood-stained discharge, which very quickly becomes sanious, owing to the infection of necrotic tissue by saprophytic organisms. At the same time, there is constant pain resembling that caused by metritis. As the growth spreads, the discharge increases, and there may be profuse attacks of hæmorrhage owing to ulceration involving the walls of a vessel. The pain also increases as the trunks of the sacral nerves become involved. If there

Pain (may be late)
Haemorrhage
Foetid discharge
Cachexia

Complications: 1 General Peritonitis
2 Metastatic Pneumonia
3. Suppression of Urine &
Uraemia

[illegible]

is much sloughing, the patient may have the symptoms of septic absorption, and the infection may travel to the peritoneal cavity and cause a general peritonitis. In the last stages, the ureters may be compressed, so causing supression of urine and consequent uræmic poisoning; and, if the lungs are involved, metastatic pneumonia will result.

Diagnosis.—Cancer of the body of the uterus in its early stages will be suspected from the foregoing symptoms, espe-

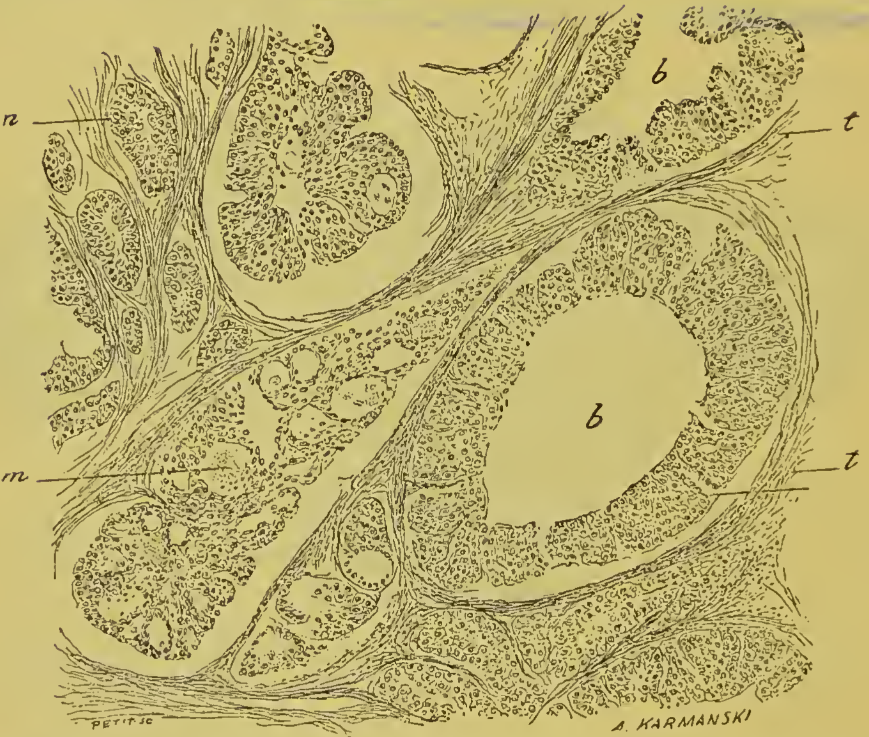


FIG. 62.—Carcinoma of the body of the uterus. Large clusters of epithelial cells lying in spaces between the muscular and connective tissue. *n.* Smaller cluster. *t.* Bundles of muscle or connective tissue. (*Cornil.*)

cially if they are associated with a more or less uniform enlargement of the uterus. Its existence can be confirmed by the removal, and subsequent microscopical examination, of a fragment of the endometrium. Cancer of the body may be very closely simulated, so far as the symptoms and physical signs are concerned, by a sloughing submucous myoma, and also by some of the forms of *endometritis. It is also by no means uncommon for malignant disease of the endometrium to be

* Glandular

associated with myomata, and in such cases microscopy affords the only means of diagnosis. The only condition which may perhaps be confounded with malignant disease, if a careful microscopical examination is made, is glandular endometritis, owing to the hyperplasia of the glands which occurs. A diagnosis can always be arrived at by a competent pathologist, if the following points in the microscopical appearances of cancer are borne in mind :—

(1) The epithelial lining of the glands becomes multiplied, so that masses of superimposed cells are found.

(2) The basement layer of flat cells, which is found between the glandular cul-de-sacs and the connective tissue, disappears, so that the epithelial cells spring directly from the connective tissue (Cornil).

(3) The ciliæ of the cells are lost (Cornil).

(4) The glands extend deeply into the muscular coat of the uterus.

It must be most carefully borne in mind, that, if patients suffering from cancer of the uterus are to be operated on at a sufficiently early date to render a permanent cure possible, a portion of the endometrium must be removed for microscopical examination in every case in which we find irregular hæmorrhages persisting in an elderly woman. The same course must also be adopted in the case of young women where recurrent hæmorrhages do not cease after the ordinary treatment of these cases—curetting, etc.—has been tried.

Prognosis.—If the uterus is removed before the neighbouring tissues or glands are implicated, the prognosis is good. However, unfortunately, it is not often that the patient is seen at such an early stage. In cases in which the patient is not operated upon, or in which after operation the growth returns, death will occur from one or other of the following causes :—

(1) Uræmia from compression of the ureters.
(2) Septic absorption from the sloughing tumour.
(3) Peritonitis from the same cause.
(4) Anæmia due to long-continued hæmorrhage, or syncope from a sudden attack due to the ulceration of the walls of a blood-vessel.
(5) Intestinal obstruction due to extension of the cancer to the intestines.

(6) Secondary infection of the lungs.

Treatment.—Radical treatment, consisting in the performance (1) of hysterectomy, is always indicated under the following condition:—That the disease is apparently limited to the uterus, as shown by the fact that no appreciable infiltration of the surrounding tissues or of the lymphatic glands can be felt.

The form of hysterectomy, which has been most usually practised up to the present, is vaginal hysterectomy (*v.* page 359). Of late, however, chiefly following the teaching of Kelly of Baltimore, ventral hysterectomy is being introduced as the operation of election for these cases. The advantages which this latter operation presents are:—that more radical measures can be taken to remove the whole of the affected tissues round the uterus, and even the infiltrated retro-peritoneal lymphatic glands; and that the uterus can be removed without opening its cavity, as is frequently necessary on account of its size when vaginal hysterectomy is performed. This is a point of great importance, as when the uterus is removed intact, there is not the same risk of infecting the cut edges of the wound with the malignant growth from the interior of the uterus. The disadvantages of ventral hysterectomy are:—That it takes longer to perform; that it is a more difficult operation; and that the attendant shock to the patient is greater than in the vaginal operation.

If the disease is too extensive to permit of a radical operation, (2) then temporary relief can be given to the patient by curetting and cauterising the interior of the uterus as recommended by Marion Sims (*v.* page 335). If this proceeding is properly carried out, a cast of the inside of the uterus is thrown off, and the resultant benefit to the patient caused by the checking of the sanious discharge, though temporary, is considerable.

N. p.146 CANCER OF THE CERVIX.—Cancer of the cervix may be either squamous-celled, when the growth starts in the portion of the cervix which is covered by compound squamous epithelium, or cylindrical-celled, when it starts as an adeno-carcinoma from the cervical glands. It is a very much more common affection than is cancer of the body, and may occur at any time ✗ between the ages of twenty-five and sixty. Practically, it is only met with in women who have borne children.

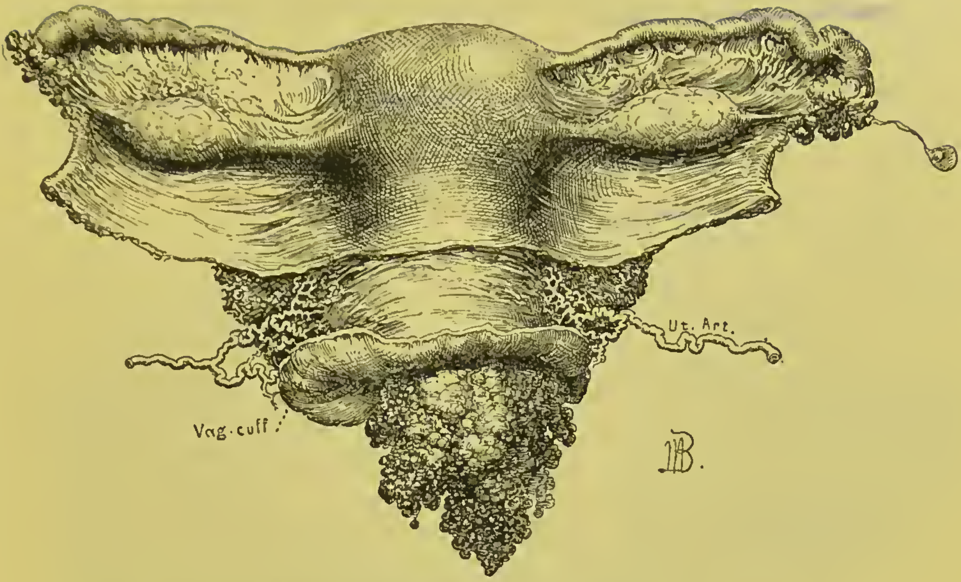


FIG. 63.—Papillary squamous-celled cancer of cervix. (½ scale.) (*Clark*)

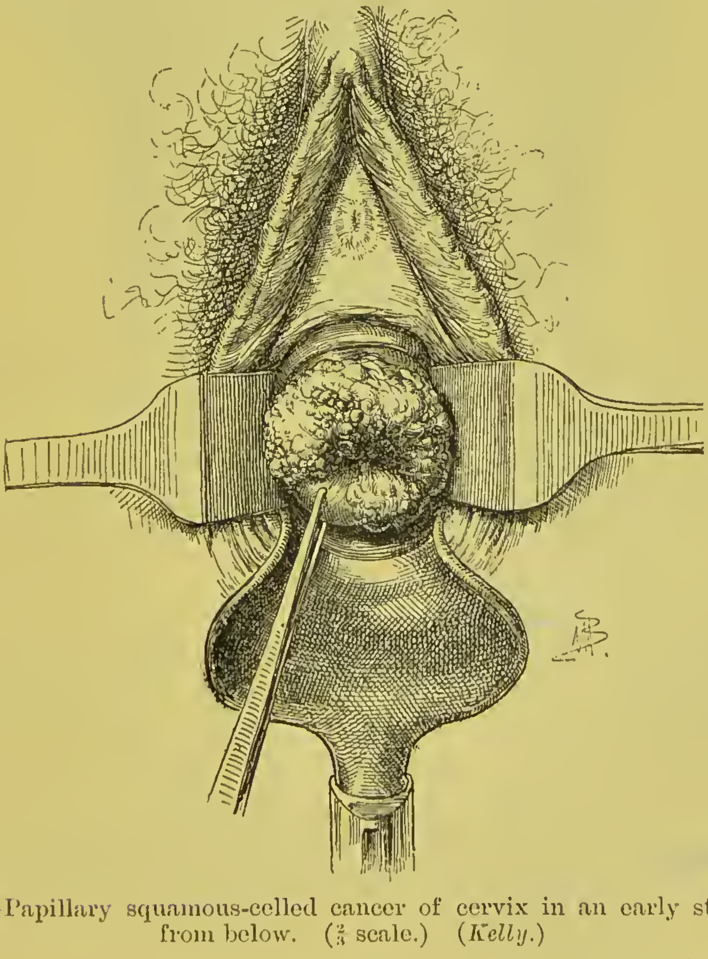


FIG. 64.—Papillary squamous-celled cancer of cervix in an early stage, seen from below. (⅔ scale.) (*Kelly.*)

Pathological Anatomy.—Clinically cancer of the cervix is met with in one of three forms :—

(1) A papillary or proliferating form, in which a warty, cauliflower-like mass is found projecting downwards into the vagina. This is usually a squamous-celled growth (*v.* Figs. 63, 64).

(2) An ulcerative form, in which the malignant growth, starting in the cervical canal, has extended outwards into the cervical and paracervical tissue without invading the external mucous membrane (*v.* Fig. 65). In the later stages the mucous membrane does become involved, and the entire cervix is eaten away, so that on passing the finger into the vagina a large cavity is found at the top, resembling an inverted crater (*v.* Fig. 66).

(3) A nodular form in which the disease starts as one or more small kernel-like masses in the cervical tissue (*v.* Fig. 67). As these growths come to the surface and increase in size, the nodular condition disappears and a papillary-like mass is formed.

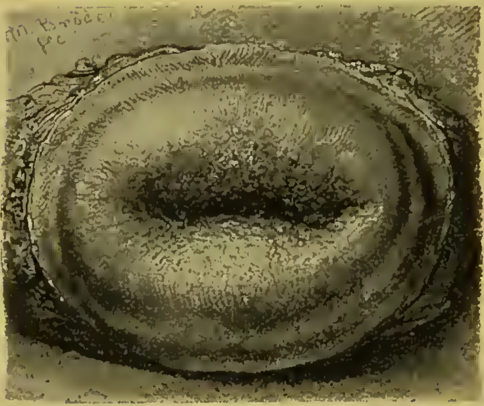


FIG. 65.—Adeno-carcinoma of the cervix, showing only slight involvement of the vaginal portion, seen from below. (Natural size.) (*Cullen.*)

Although it is usually considered that cancer of the cervix never tends to extend into the uterus, still, isolated cases have been recorded in which nodules of squamous-celled cancer have been found in the body, and in which a direct connection through the lymph channels has been traced to pre-existing cancer of the cervix. Such cases are however quite exceptional.

Symptoms.—The symptoms resemble those of cancer of the body. In the early stages, they may be very slightly marked

or Later Symptoms.

mplications. 1 Uraemia

2. Intestinal Obstruction

3. Recto-Vaginal Fistula

the unfortunate result of which is, that, frequently a patient does not obtain medical advice until it is too late for anything to be done. The later symptoms of the case are the result of the invasion of the neighbouring organs by the growth.

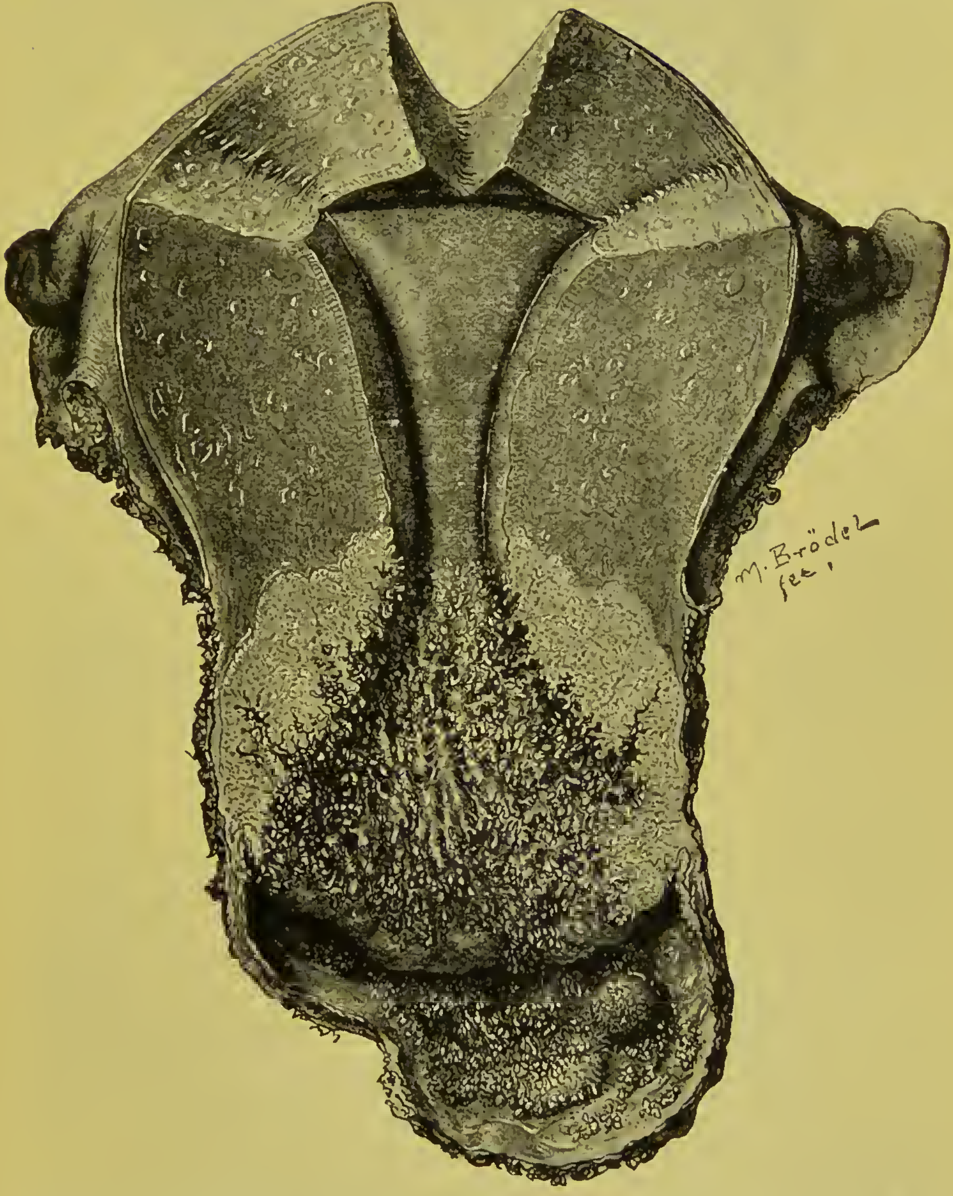


Fig. 66.—Squamous-cell cancer of the cervix with extension to the vagina, showing extensive ulceration of the cervix tissue. (Natural size.) (*Cullen.*)

Uræmia may occur from obstruction of the ureters, intestinal obstruction from involvement of the rectum, a recto-vaginal fistula from the same cause, or a vesico-vaginal fistula from

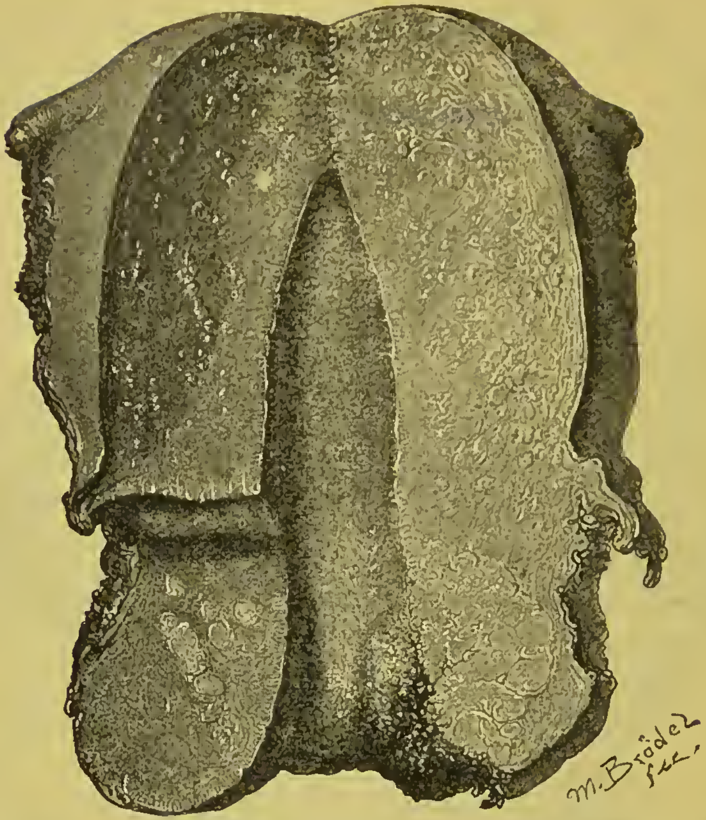


FIG. 67.—Adeno-carcinoma of the cervix, showing nodular masses in the cervical tissue, and only slight involvement of the mucous membrane of the vaginal portion of the cervix. (Natural size.) (*Cullen.*)

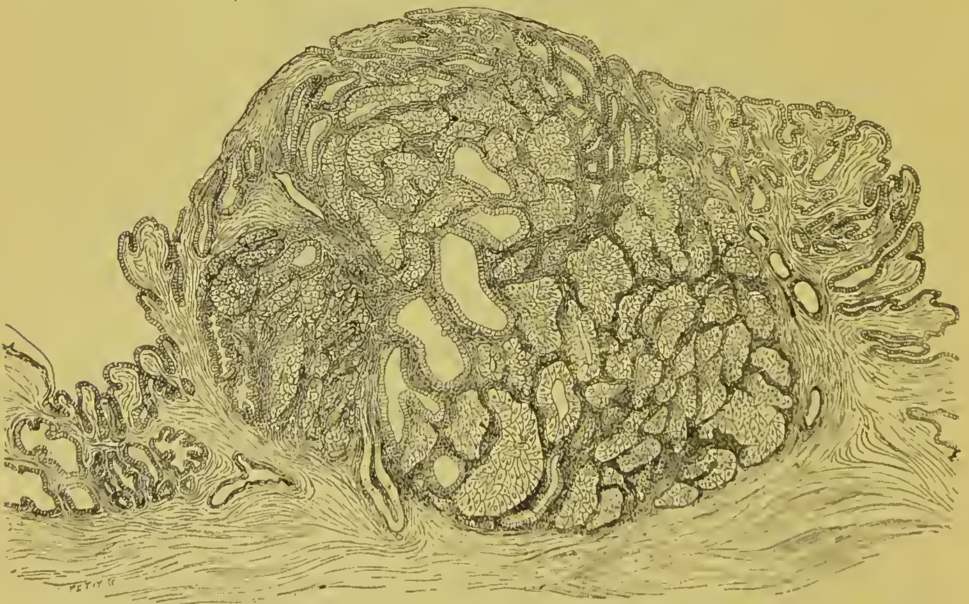


FIG. 68.—Adeno-carcinoma of cervix. Section of nodule growing in the cervical mucous membrane. (*Wyder.*)

involvement of the bladder. Finally, metastatic growths may occur throughout the body.

Prognosis.—The prognosis of cancer of the cervix, even after early operation, is rather worse than the prognosis of cancer of the body, inasmuch as the liability to its return seems to be greater. In cases in which the patient is not operated upon, or in which the growth returns after operation, the causes of death are the same as in cancer of the body.

Treatment.—The same remarks apply to cervical as to corporeal cancer. If possible the whole uterus must be removed. Hysterectomy performed through the vagina is the operation usually adopted (*v.* page 359). Kelly recommends the more radical abdominal operation in these cases also. The operation devised by Werder of Pittsburg, in which the uterus is removed by a combined abdominal and vaginal operation, appears to offer great advantages as it enables a very complete separation and removal of the vaginal vault to be carried out. Supra- or infra-vaginal amputation of the cervix, which was formerly considered to be sufficient, has been rightly given up.

If the case is too far advanced for any radical treatment, much temporary benefit can be obtained by carrying out Marion Sims' treatment of curetting and cauterisation (*v.* page 335.)

SARCOMA UTERI.

Sarcoma usually occurs during the child-bearing period. In this respect it differs from cancer which usually starts about the menopause. It is also very much rarer than the latter, and, of the different forms, cervical sarcoma is the rarest.

Varieties.—Three forms of uterine sarcomata are met with:—

(1) Cervical sarcoma, or cystic myxo-sarcoma of the cervix.
(2) Spindle-celled sarcoma of the muscular coat of the uterus, or fibro-sarcoma.
(3) Round-celled sarcoma of the endometrium. { i. Localised
ii Diffuse

Pathological Anatomy.—Cervical sarcoma starts as a collection of polypi, resembling mucous polypi, hanging from the cervix. These polypi are soft, semi-cystic, and grow rapidly until finally the mass resembles a bunch of grapes (*v.* Fig. 69). Cervical sarcoma may also occur as a more diffuse form, clinically resembling squamous-celled carcinoma. Spindle-celled fibro-sarcoma starts in the thickness of the muscular coat of the uterus, and grows in a circumscribed manner. It is questionable whether this form starts as a sarcoma, or whether it is the result

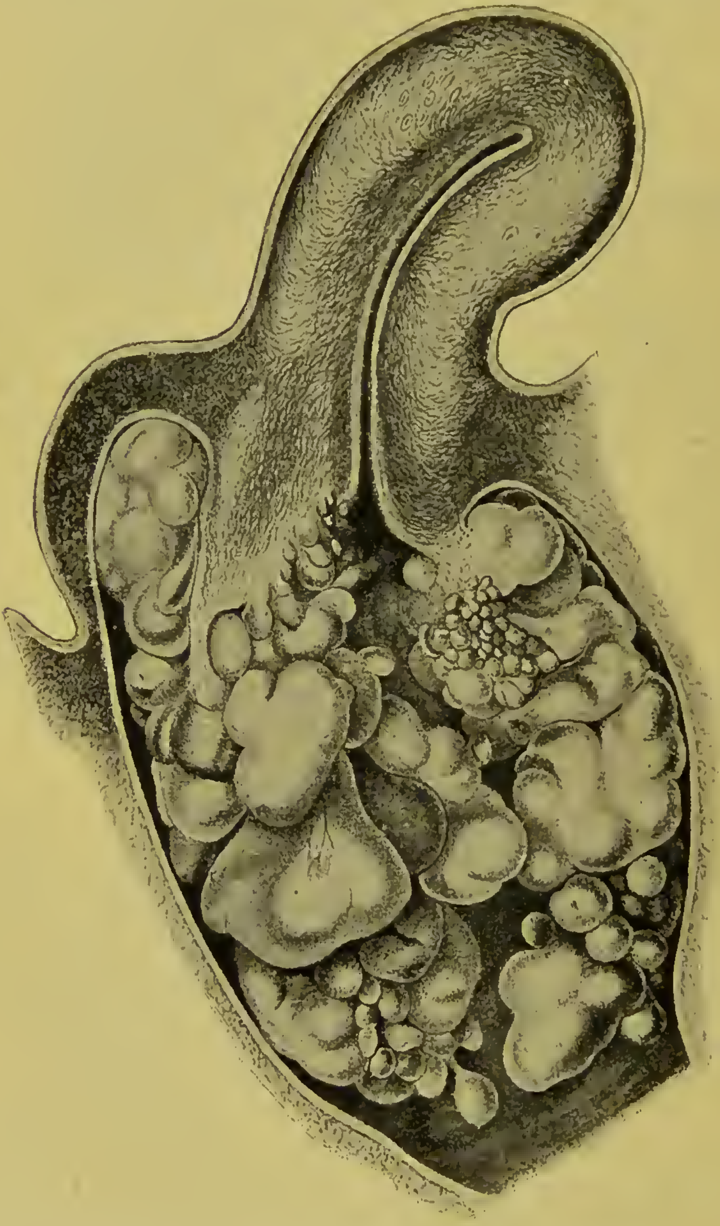


FIG. 69.—Cystic myxo-sarcoma, or grape-like sarcoma, of the cervix. (*Küstner.*)

of sarcomatous degeneration taking place in a pre-existing myoma. Round-celled sarcoma of the endometrium occurs in two varieties:—as a localised sessile or pedunculated growth varying in size from that of a pea to that of a small hen's egg (v. Fig. 70); and, as a diffuse malignant degeneration which affects part of or the entire endometrium.

Symptoms.—The symptoms of the cervical form are at first very slightly marked, but, as the sarcoma grows, the same symptoms result as in cancer of the cervix. The circumscribed fibro-sarcoma causes at first the same symptoms as does a * myoma, save that it grows more rapidly. At a later stage, it gives rise to the usual symptoms of malignant disease. A pedunculated sarcoma of the endometrium gives rise at first to no particular symptoms. Diffuse sarcoma of the endometrium

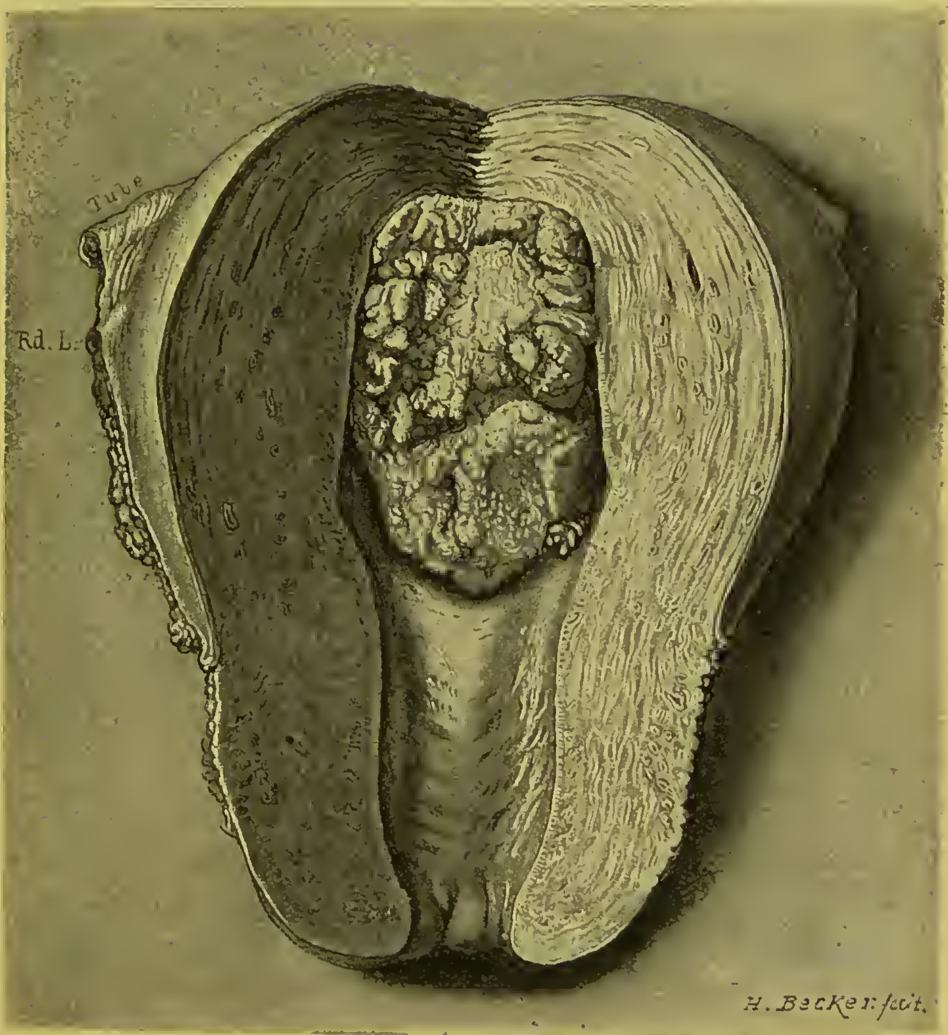


FIG. 70.—A circumscribed round-cell sarcoma of the body of the uterus. (Natural size.) (*Cullen.*)

* Disturbances of menstruation
Pressure symptoms.

Later

S of Body. Uniform Enlargem
Infiltration → Pelvic Stru
[illegible]

causes the same symptoms as cancer of the body, with perhaps the exception that the pain is less. A tolerably common accompaniment of this form of sarcoma is hæmatometra, *i. e.* an accumulation of blood in the uterus, the result of the cervix becoming occluded by the growth of the tumour.

Diagnosis.—The diagnosis of cervical sarcoma can usually be made from the characteristic appearance of the growth hanging from the cervix. In sarcoma of the body, the uterus is more or less uniformly enlarged according as the disease is far advanced or not. If the disease has spread beyond the uterus, infiltrating masses can be felt in the pelvic connective tissue. When the growth has reached this stage, its further course resembles that of cancer. In the early stages, the diagnosis can seldom or never be made without a microscopical examination. Fibro-sarcoma, and pedunculated sarcoma of the endometrium, are very likely to be mistaken for myomata.

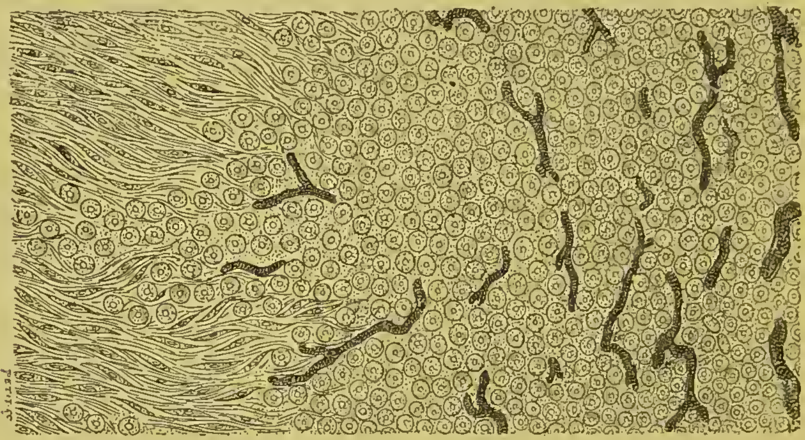


FIG. 71.—Diffuse round-celled sarcoma of the endometrium. (*Wyder*).

Prognosis.—The prognosis is more favourable than that of cancer if the case is operated on at a comparatively early stage, as sarcoma generalises itself less rapidly. In cases which are not operated upon, the prognosis is the same as that of cancer, and death usually comes about in the same manner.

Treatment.—The treatment is the same as that of cancer. Total hysterectomy is always indicated if the case is seen in time; if not, and if the discharges are profuse, curetting and cauterisation may be performed with a view to checking the discharge.

DECIDUOMA MALIGNUM.

Deciduoma malignum is the term applied by Sänger to a malignant growth which starts in the uterus, presumably from the fœtal membranes; invades the uterine wall; causes metastases in other organs; and quickly brings about the death of the patient.

Ætiology.—The ætiology of so-called deciduoma malignum is still quite unsettled. Even a suitable name for the growth has not been definitely fixed upon, and the only fact which is undisputed is the intimate connection of the tumour with pregnancy. Four theories as to its cause are worthy of mention:—

(1) That the tumour arises from the decidua cells (Sänger). This was the first theory as to the ætiology of the tumour, and led Sänger to give it the name deciduoma malignum, a name which he later changed to *sarcoma deciduo-cellulare*.

(2) That the growth starts from one or both of the two epithelial layers covering the chorionic villi,—the syncytium and Langhans' layer. This theory is open to several different interpretations, according as the syncytium is considered to be a maternal or fœtal structure. Whitridge Williams considers that the new growth arises in the syncytium, and regards the latter as a maternal structure formed from the uterine mucous membrane. Fraenkel and Durante also believe that the growth arises in the syncytium, but regard the latter as of fœtal origin, and apply the term syncitial or ectodermal epithelioma to it. Marchand considered that the growth springs from both layers and that both are fœtal in origin, and terms it a chorio-epithelioma. While Gebhart also believes the growth to develop from both layers, but differs from Marchand in regarding the syncytium as maternal in origin. He, accordingly, considers the growth to be a mixed carcinoma of maternal and fœtal structures.

(3) That the tumour arises from the stroma of the villi (Gottschalk). It would in such a case be a sarcoma, and Gottschalk applies the name *chorio-sarcoma* to it. This view has received but small support.

(4) That the growth is the result of the influence of pregnancy on a pre-existing sarcoma (Veit, Eden).

Of these various theories, Marchand's has the greatest amount of evidence in its favour, and is now most generally accepted. Veit's theory has also received a considerable amount of support, especially in the past from the London school. The latter has however of late come round, in great part at least, to Marchand's theory.

Pathological Anatomy.—Deciduoma malignum starts as a rule, in or near the fundus of the uterus, as a pedunculated or sessile tumour, varying in size from that of a pea to that of an orange, or even larger. As its size increases, the interior of the uterus is filled with a friable, irregular, sometimes sloughing mass, which bleeds with great freedom, and can be brought away with a curette in large fragments. The uterine wall is rapidly involved by the growth, which spreads into it along the blood-vessels. The tumour then extends into the neighbouring tissues, and also causes metastases in different organs—particularly the lungs—by means of particles carried away in the blood-stream.

Before describing the microscopical appearance of a deciduoma, it is necessary to note the nature of the covering of the chorionic villi from which the growth is supposed to develop.

A chorionic villus is covered by two layers of cells. The outer layer, which is known as the syncytium, is composed of large cells, or protoplasmic masses, with several nuclei, and is epithelial in origin. The inner layer—Langhans' layer—is composed of cubical or flattened cells, containing clear protoplasm, and possessing a single round or oval nucleus. It is uncertain whether it is endothelial or epithelial in origin.

Three sets of cells are found in a deciduoma :—

(1) Large, irregular, opaque, and multinucleated cells, or protoplasmic masses, which are derived from the syncytium, the so-called "plasmodial masses."

(2) Large, globular, transparent, and mononucleated cells which are derived from Langhans' layer, and are known as "clear cells."

(3) Cells resembling decidual cells and known as "chorion wandering cells."

The growth proper is made up of plasmodial masses and clear cells, while the chorion wandering cells are a kind of advance guard which penetrates amongst the muscle fibre, the tumour itself only extending into the blood-vessels.

Symptoms.—The earliest symptoms of deciduoma resemble those caused by a decomposing abortion which has been retained in the uterus :—hæmorrhage ; a watery and fœtid discharge; and, perhaps, the expulsion of fragments of the tumour itself. As the growth involves more and more of the uterine wall, the hæmorrhage becomes more constant and larger in amount. The patient rapidly becomes cachectic, and the onset of lobular pneumonia shows that the lungs are becoming involved.

Diagnosis.—The case at first is usually taken for one of incomplete abortion ; but, on examining the patient bimanually, the uterus is found to be enlarged, and, if sufficient time has elapsed since the tumour started, there may be an extension into the broad ligament. When the interior of the uterus is explored, it is found to be filled by masses of soft and friable tissue. If this is examined microscopically, typical deciduoma structure will be found.

Treatment.—Immediate hysterectomy is the only treatment. Unfortunately, the rapidity of the growth is such that very few cases have been seen at a sufficiently early date to remove the disease completely. If at all possible, an attempt should however be made, as no other means will be of any avail to check the hæmorrhage ; and, even if that is the only result obtained, the patient's life will be somewhat prolonged. The extreme rapidity with which dissemination takes place is an imperative reason for the early exploration of the uterus in those cases in which hæmorrhage continues after abortion, and especially after the expulsion of a hydatidiform mole.

TUBERCULOSIS OF THE UTERUS.

Tuberculosis of the uterus, as a primary condition, is a comparatively rare disease ; it is more common as the result of extension from a tuberculous tube or ovary, or as part of a general tuberculous process.

Varieties.—It occurs in three forms (Pozzi) :—

(1) An acute miliary form. This occurs as an acute miliary process, accompanying the same condition in other organs.

(2) An interstitial form. This may occur in the uterine wall, and cause few or no symptoms until it manifests itself by some sudden and serious accident, such as rupture of the weakened uterus during delivery.

(3) An ulcerative form. This is the commonest form; in it the disease starts as small nodules in the endometrium or in the vaginal portion of the cervix. These nodules gradually coalesce and break down, until finally the entire endometrium and endocervix are replaced by tubercular tissue which in places is becoming caseous.

Diagnosis.—The symptoms of the patient in the early stage are those of endometritis. Later on, as the disease spreads, and the uterus becomes infected by other micro-organisms, the patient becomes hectic, and exhibits the general symptoms of a mixed tuberculous infection. If the uterus is curetted at an early stage, there may be no naked-eye change in the endometrium. But, if the removed fragment is examined microscopically, typical tuberculous structure will be found. In later stages of the disease, when caseous changes are taking place, the existence of tuberculous lesions may be suggested by the appearance of the removed portions. Tubercle bacilli may be found in the sections and in the uterine discharges, but as a rule they are very few and difficult to find.

Treatment.—If it could be positively determined that the tuberculosis was entirely limited to the endometrium, it might be sufficient to thoroughly curette and cauterise the latter. It is, however, practically impossible to do this, and consequently it is necessary, in all cases where a diagnosis of tuberculosis is made, to remove the uterus. It may be that the introduction of steam into the uterus (Pincus) (*v.* page 327), or of boiling water (Schick), will be found to be of use.

CHAPTER X.

DISEASES OF THE FALLOPIAN TUBES.

Inflammatory Diseases of the Tubes. Salpingo-oöphoritis—Ætiology—Pathological Anatomy: Salpingitis—Acute Salpingitis—Chronic Salpingitis: Varieties — Hæmatosalpinx: Oöphoritis — Acute Oöphoritis — Chronic Oöphoritis — Symptoms — Diagnosis — Prognosis — Treatment, Palliative, Radical. New Growths of the Tubes: Benign Neoplasms — Malignant Neoplasms. Tuberculosis of the Tubes—Pathological Anatomy—Treatment. Tubal Pregnancy.

THE following are the various pathological conditions met with in the Fallopian tubes:—

Inflammatory diseases.
New growths.
Tuberculosis.
Tubal pregnancy.

INFLAMMATORY DISEASES OF THE TUBES.

Inflammatory diseases of the tube are most usually associated with a similar condition of the ovaries. The train of symptoms, and the physical signs to which either condition gives rise, are practically identical, whether either exists separately or whether they are found to co-exist. Accordingly, it will be best to describe the two under the heading *salpingo-oöphoritis*, but at the same time the distinctive lesions of each structure must be described separately. Tuberculosis of the ovary and tube will be referred to under this head also, as it is impossible in the great majority of cases to distinguish, without the aid of the microscope, the lesions which it causes from those produced by other pyogenic bacteria.

SALPINGO-OÖPHORITIS.

Salpingo-oöphoritis (σάλπιγξ, a trumpet; ᾠόν, an egg; φορέω, I bear), in some of its forms, is the most frequent and important result of bacterial infection of the pelvic contents. Its occurrence was recognised for a long time, but it is only during the last twenty or thirty years that its importance has been understood, and that its pathology and the means of curing it have been elaborated. Lawson Tait in 1872 was the first person to successfully remove inflamed appendages; and since that time, our knowledge of the disease has continued to advance rapidly.

Ætiology.—Salpingo-oöphoritis is always bacterial in origin. In almost 50 per cent. of those cases in which micro-organisms have been found in the contents of the tubes, the gonococcus was present. In the remainder of the cases, the *Streptococcus* and *Staphylococcus pyogenes aureus*, the *Bacillus coli communis*, the tubercle bacillus, and the pneumococcus were found. In a little more than 40 per cent. of the total number of cases examined, the pus was found to be sterile. Some of these cases were probably of tuberculous origin, the remainder were cases in which the infecting organisms had died.

The origin of the infection in the greater number of cases is
i. a previous metritis, which in turn has been caused by the
extension of infection upwards from the vagina. In this
manner, gonorrhœal and puerperal infections of the tubes
occur. In other cases, infection occurs directly from the
ii intestine through the walls of the tube or ovary, or through
lymphatics which run in the ligament connecting the right
ovary with the vermiform appendix (Vallin). In such cases,
ovarian infection will frequently precede the tubal infection,
while in the case of extension of infection from the uterus the
iii. reverse is the case. Tuberculous infection may occasionally
occur as an extension of a primary infection of the uterus or
pelvic peritoneum, but primary infection of the tube is the
more common occurrence. In the latter case the infection is
carried in the blood-stream.

In addition to these modes of infection, salpingo-oöphoritis
iv has been noticed after infective diseases, as—typhoid, measles,

scarlatina, cholera, smallpox, and influenza. Syphilis and actinomycosis must also be added as very rare causes of the same condition.

Pathological Anatomy.—In the greater number of cases, salpingo-oöphoritis is a bilateral condition. This is due to the proximity in which the appendages lie to one another; and also to the fact that, in those cases in which the uterus is the starting-point of the infection, it is unlikely that such infection should extend into one tube and spare the other which was exposed to it to the same degree. Similarly, if the tube becomes infected, the ovary is very unlikely to escape, also owing to its close approximation (*v.* Fig. 72). The rapidity with which the ovary is infected from the tube depends to a great extent upon the time at which the tubal infection takes place. If the latter occurs when ovulation is in process, and when the fimbriated extremity of the tube is in consequence applied to the ovary, the tendency of the resultant inflammation will be to fix the latter in that position. Then, if suppuration occurs in the tube, the intervening wall of the ovary is gradually destroyed and a tubo-ovarian abscess forms (*v.* Fig. 73); or, even if the wall is not destroyed, bacteria travel through it and set up one or more foci of infection in the ovarian tissue.

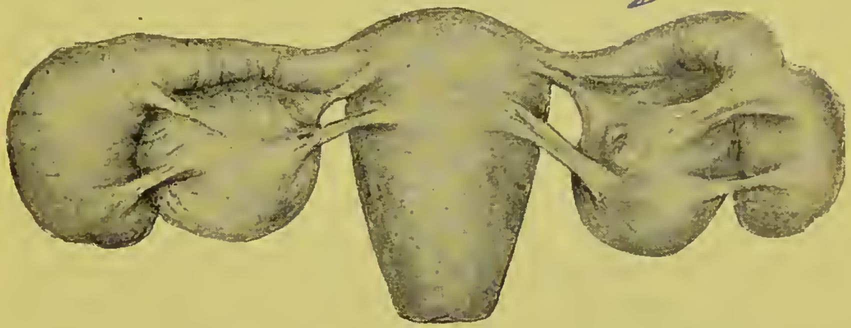


Fig. 72.—A typical case of salpingo-oöphoritis. ('Report of the Rotunda Hospital,' 1896-7.)

In order to discuss the various forms under which tubal and ovarian inflammations are met, it will be necessary to consider the pathological anatomy of salpingitis and oöphoritis separately.

Salpingitis.—Two varieties of salpingitis (σάλπιγξ, a trumpet) are met with:—

(A) Acute salpingitis.
(B) Chronic salpingitis.

(A) **Acute Salpingitis.**—Acute salpingitis can be divided into endosalpingitis and interstitial salpingitis, as will be done in the case of chronic salpingitis, according as it attacks the mucous membrane or the muscular coat. In acute salpingitis, however, the forms are more prone to run into one another and so to occur in conjunction in all cases. Accordingly, it does not seem to be necessary to make such a distinction.

In a typical case of, for instance, gonorrhœal salpingitis, an acute infection spreading upwards from the uterus may, in one case, cause primarily an endosalpingitis; in another case, an interstitial inflammation. Whichever of these started first will, as a rule, be quickly followed by the other, and the two conditions will co-exist. The pus which forms in the tubes gradually escapes into the uterus or into the peritoneal cavity, if the turgescence of the mucous membrane near the end of the tube does not completely block the ostia. If, on the other hand, the outflow of pus is obstructed, owing to the blocking of

o-Salpingitis
terstitial
alpingitis
usu. combined

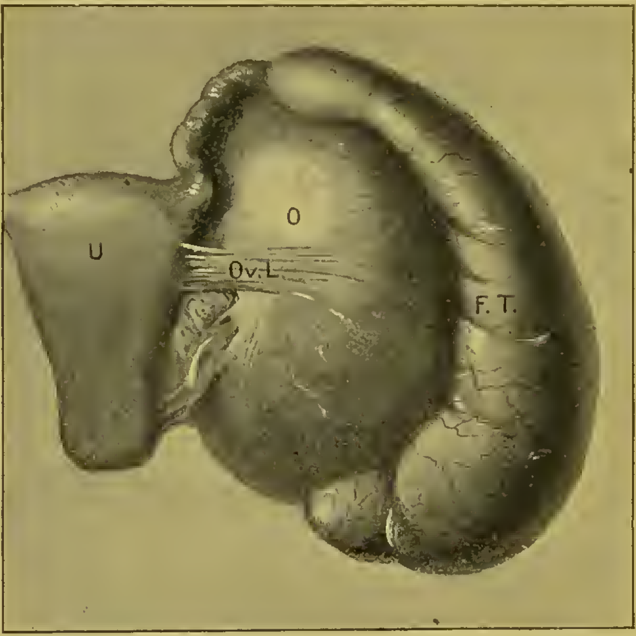


FIG. 73.—A tubo-ovarian cyst, the result of salpingo-oöphoritis. U. Uterus. O. Ovary. F. T. Fallopian tube. OV. L. Ovarian ligament. (From a specimen in the Pathological Laboratory, Trinity College, Dublin.)

both ostia of the tube, the pus accumulates, and finally the tube is converted into a pus-containing sac, and the condition dition known as pyosalpinx (πῦον, pus; σάλπιγξ) results.

As the pus continues to accumulate, the walls of the tube become by degrees thinner, until finally all trace of their previous structure has disappeared (*v.* Fig. 74).

The macroscopical appearance of a tube in the early stages of acute endosalpingitis is not very striking. The tube is slightly enlarged, congested, and œdematous; and on cutting it open, the mucous membrane is seen to be thickened and inflamed. There is a small amount of muco-purulent or purulent fluid accumulating in the cavity. The fimbriæ are also swollen and covered with flakes of lymph, and there may be some friable adhesions in process of formation between the tube and intestines. If there is interstitial inflammation present as well, as is usually the case, the tube may be enlarged up to the size of the finger, an enlargement which is brought about by the thickening of the walls and not by the dilatation of the cavity, and minute points of pus may be seen scattered about in the thickness of the walls. If the tube has become cystic owing to the non-escape of the pus, its shape and appearance are characteristic. A distended tube, or sacto-salpinx as it is sometimes termed, unless interfered with by the presence of adhesions, becomes of a retort-like shape, the larger end corresponding to the outer third of the tube, the narrower to the

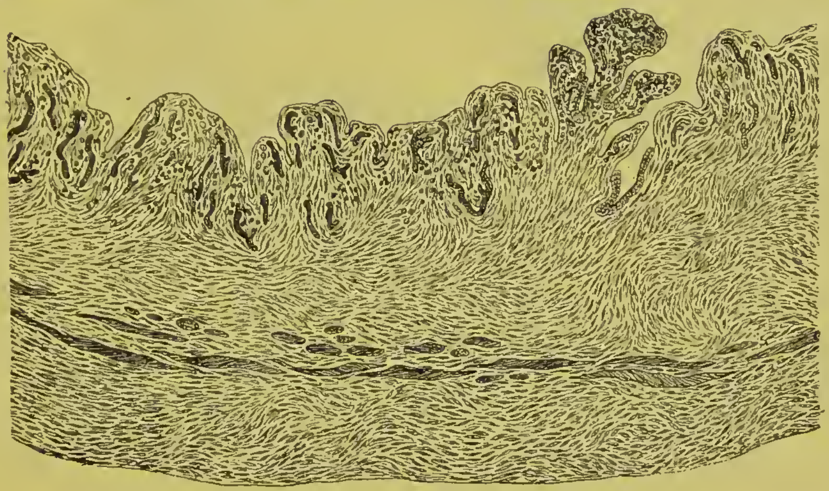


Fig. 74.—Section through the wall of the tube in a case of pyosalpinx. (*Wyder.*)

uterine insertion; while the fimbriæ have completely disappeared. The mechanism by which the abdominal ostium of the tube is occluded is worthy of note. In some cases, the fimbriæ, spread out fanwise, become adherent to some neighbouring structure, as the ovary, the back of the broad ligament, or the floor of Douglas' pouch. In other cases, a more interesting mechanism occurs.—" When the tubes are inflamed,

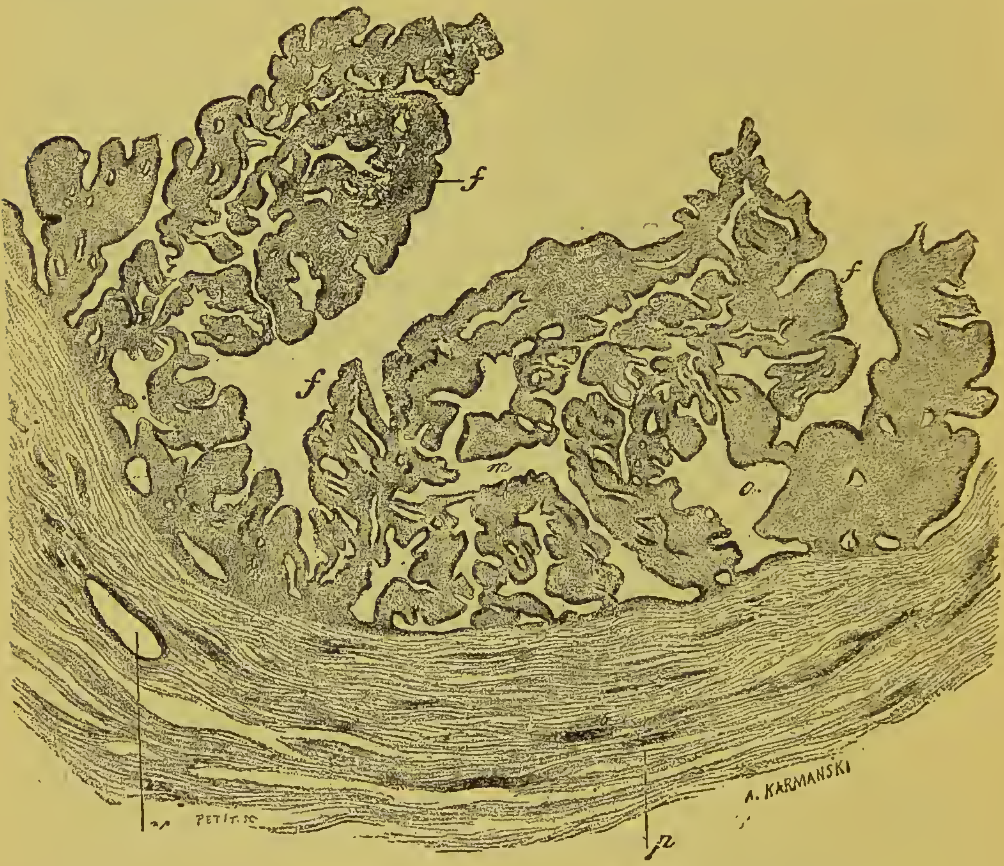


FIG. 75.—Acute purulent salpingitis. Transverse section through wall of tube. (× 12 diameters.) *f, f.* Thick vegetations, anastomosing one with the other and leaving between them spaces resembling glands. *p.* Wall of tube. *v.* Blood-vessel. (*Cornil.*)

B the muscular and serous coats lengthen, and bulge over the fimbriæ until each ostium appears as a rounded smooth orifice instead of being fringed; gradually the rounded margins contract, cohere, and occlude the opening. In the early stage, if the rounded end of the occluded tube be slit up the fimbriæ will be found crowded inside the tube." (Bland-Sutton.)

The microscopical appearance of a case of acute salpingitis is as follows:—The sub-epithelial layer of the mucous membrane is infiltrated with small round cells and the vessels are dilated; as a result, there is a marked increase in the size of the folds of the mucous membrane. On the surface of the folds are seen small vegetations, which tend to become adherent one to the other and so to cause the formation of crypts in the walls (*v.* Fig. 75). If the affection has extended beyond the mucous membrane, the walls of the tube are greatly thickened, partly owing to the formation of new cells, and partly owing to a round-celled infiltration and vascular dilatation. In the walls are seen minute points of pus, and colonies of the infecting bacterium are found in the lymphatic interspaces. If the tube is cystic as a result of the blocking of its ostia, the walls become thinned in proportion to the amount of internal pressure; the epithelium completely disappears; and the normal structure of the walls becomes changed, by the atrophy of the muscular coat, into a layer of connective tissue interspersed with a round-celled infiltration and dilated vessels.

(B) **Chronic Salpingitis.**—Chronic salpingitis occurs as the sequence of an attack of acute salpingitis, or in consequence of the infection of the tube by a less virulent type of infecting agent from that which causes acute salpingitis. Two forms of chronic salpingitis are met with:—

(1) Chronic endosalpingitis—catarrhal salpingitis—or inflammation of the tubal mucous membrane.

(2) Chronic interstitial salpingitis, or inflammation of the walls of the tube.

(1) *Chronic Endosalpingitis.*—Chronic endosalpingitis (ἔνδον, within; σάλπιγξ) or inflammation of the mucous membrane lining the tube is, in those cases in which it exists alone, most frequently the result of a subacute infection. If such is the case, a serous catarrhal inflammation results, and, if the ostia of the tube become blocked, the condition known as hydrosalpinx (ὕδωρ, water; σάλπιγξ) results. If the infection is pyogenic in character, and the outflow of pus is similarly prevented, a pyosalpinx may result, as in the acute condition. Chronic endosalpingitis, and interstitial salpingitis, most usually co-exist in those cases which are the sequence of an attack of acute salpingitis, but as a rule one or other form predominates.

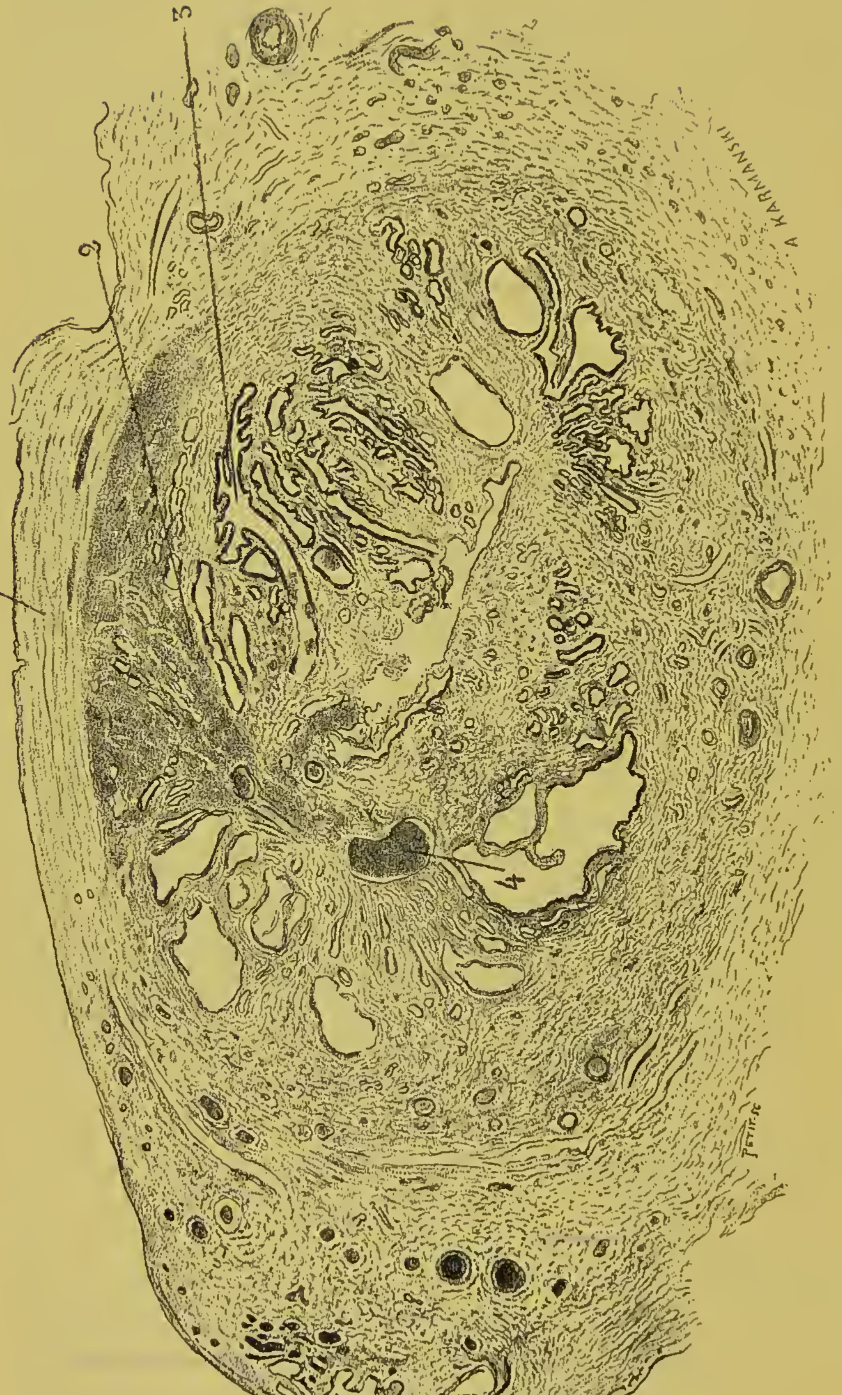


Fig. 76.—Chronic interstitial salpingitis. Transverse section through entire tube. (× 10 diameters.) 1. Thickened tube wall. 2. Thickened and anastomosing tubal villosities. 4. Blood-vessel. 5. Accessory tubal lumen. (*Possi.*)

(2) *Chronic Interstitial Salpingitis.*—Chronic interstitial salpingitis results in extreme thickening of the walls of the tube, so that the latter may reach the size of a finger or even more without any dilatation of its lumen. The characteristic macroscopical and microscopical appearances are practically the same as those which have been described under the acute form, save that the congestion of the tube is not so marked (*v.* Fig. 76).

In connection with pyo- and hydrosalpinx, there may be mentioned a third cystic condition of the tube, which though not always due to inflammatory changes may be sometimes attributed to this cause. This is the condition known as hæmatosalpinx; that is to say, that condition in which the tube is distended with blood.

Hæmatosalpinx (ἅιμα, blood; σάλπιγξ) may be brought about in three ways :—

(1) By the rupture of the walls, or of vessels in the walls of the sac, of a tubal pregnancy. This is very much the commonest cause of a hæmatosalpinx, and is even said by some authorities to be the only cause. There do not, however, appear to be sufficient grounds for making so definite a statement, and it is probable that many cases of hæmatosalpinx are due to other causes. A hæmatosalpinx which is due to tubal pregnancy may be distinguished by the following signs (Labadie-Lagrave) :—

(*a*) The presence, in the blood or clot which fills the tube, of a particularly large and firm clot. It may be that the embryo will be found inside this, but most frequently it has been absorbed.

(*b*) Marked hypertrophy of the cyst walls.

(*c*) The presence of chorionic villi or of decidual cells on the surface of the mucous membrane of the tube.

(2) By the retention of menstrual blood as a result of a congenital or acquired atresia of some part of the genital passages (*v.* page 216).

(3) By the rupture of the vessels in the walls of the tube, as a result of their condition, in a case of catarrhal or interstitial salpingitis.

OÖPHORITIS.—Two varieties of oöphoritis (ᾠόν, an egg; φορέω, I bear) are met with—

(A) Acute oöphoritis.
(B) Chronic oöphoritis.

(A) **Acute Oöphoritis.**—Acute oöphoritis occurs in three forms :—

(1) Acute cortical oöphoritis.
(2) Acute parenchymatous oöphoritis.
(3) Acute interstitial oöphoritis.

(1) *Acute Cortical Oöphoritis.*—Acute cortical oöphoritis is the term applied to inflammation of the superficial tissue of the ovary, a condition which is usually found associated with acute peri-oöphoritis or peritonitis. The peri-oöphoritis has given rise to the formation of a pseudo-membranous covering, underneath which the cortical layer of the ovary is hyperæmic and slightly enlarged. If the inflammation extends inwards, the entire oöphoron, or egg-bearing portion of the ovum, may be destroyed. It is most usually the result of gonorrhœa (Labadie-Lagrave).

(2) *Acute Parenchymatous Oöphoritis.*—Acute parenchymatous oöphoritis is the term applied to inflammation of the follicles of the ovary. At first, there occurs cloudy swelling of the epithelial cells and subsequent disintegration. Later on, the follicles become filled with pus, and so the ovary is scattered over with small abscesses. Parenchymatous oöphoritis most frequently occurs after infectious diseases (Petit).

(3) *Acute Interstitial Oöphoritis.*—Acute interstitial oöphoritis is the term applied to inflammation of the interstitial tissue of the ovary. It is usually a gonorrhœal, or puerperal septic, process. The ovary increases in size owing to an infiltration of small round cells, while numerous small abscesses and cysts are scattered through its substance, starting either in the follicles or in the stroma. In some cases there may be a peculiar œdematous condition of the ovarian stroma, resembling a similar condition found in chronic oöphoritis (Pilliet). This last condition is also known as acute œdematous oöphoritis.

(B) **Chronic Oöphoritis.**—Chronic oöphoritis occurs as the sequence of an acute infection, or as a chronic process from the commencement. It is found in several forms, but though these can with advantage be described separately, it must not be forgotten that they are merely stages in the course of the same condition. These forms are as follows :—

Varieties

(1) Chronic cortical oöphoritis.
(2) Chronic interstitial oöphoritis.
(3) Chronic hypertrophic oöphoritis.
(4) Chronic atrophic oöphoritis (cirrhosis).

merely stage
Same pro

(1) *Chronic Cortical Oöphoritis.*—Chronic cortical oöphoritis consists in the formation of a growth of new connective tissue in the cortical layer of the ovary. It is usually the result of an acute cortical oöphoritis. In addition to this formation of connective tissue, there is also a cystic condition of the follicles in many cases, and not infrequently there may be a hæmorrhage either into them or into the corpora lutea.

(2) *Chronic Interstitial Oöphoritis.*—Chronic interstitial oöphoritis is a later stage of cortical oöphoritis, in which a new growth of connective tissue extends all through the ovary. It is probably always a chronic process from the start (Labadie-Lagrave). As a result of it, an œdematous infiltration of the stroma may occur, or interstitial hæmorrhages from the rupture of dilated vessels. Interstitial oöphoritis not infrequently occurs in association with, or perhaps as the result of, myomata of the uterus. Sometimes, a single central abscess may form, and either remain as a very chronic condition or increase in size until the entire ovary is destroyed.

(3) *Chronic Hypertrophic Oöphoritis.*—Hypertrophic oöphoritis is the term applied to a still later stage, in which there is so great a formation of new connective tissue that a marked increase in the size of the ovary results.

(4) *Atrophic Oöphoritis.*—This is the last stage, and supervenes upon hypertrophic oöphoritis, as a result of the shrinkage of the new connective tissue. The condition is also known as *cirrhosis of the ovary*. In it, the invasion of the ovary by the new connective tissue is complete, and there is a consequent disappearance of all normal ovarian structure.

In addition to these changes in the tube and ovary, various changes take place in the surrounding structures, especially in the pelvic peritoneum. There is always a considerable amount of pelvic peritonitis present in these cases, and sometimes the peritoneum covering the intestines is also affected. The result is that numerous adhesions are formed between the contents of the pelvis, and also between them and the intestines. To a large extent these adhesions are beneficial, as they tend to prevent the spread of the infection into the general peritoneal cavity, should the tube or ovary rupture. It is not at all an uncommon thing to find, in a case of salpingo-oöphoritis, a small collection or collections of pus lying in loculi between the numerous adhesions which fill up the pelvis. There is also, very commonly, in these cases a slight amount of parametric thickening, especially in the layers of the broad ligament.

1. Various changes sometimes take place in a cystic tube or ovary. The nature of the contents may become altered. A hydrosalpinx may be converted into a pyosalpinx; or, on the other hand, a pyosalpinx, by the gradual absorption of its cellular contents, may be converted into a hydrosalpinx. Similarly, hæmorrhage may occur into the sac of a pyosalpinx or tubo-ovarian abscess; or the contents of a hæmatosalpinx may become infected and suppurate, thus leading to the formation of a pyosalpinx.

2, The contents of a cystic tube or tubo-ovarian abscess may escape. This can occur in two ways:—either by the fluid making its way downwards into the uterus through the uterine end of the tube; or by rupture of the sac. In the former case, the escape of fluid may occur at intervals, according as the intra-tubal pressure becomes sufficiently great to overcome the resistance offered to its outflow by the swollen mucous membrane. In the case of a hydrosalpinx, this condition was formerly known as *Hydrops tubæ profluens.* In the case of rupture of the sac, the tube may burst owing to over-distension or violence, especially during a bimanual examination or any surgical interference. A ruptured tube may discharge its contents into the general peritoneal cavity, into a loculus in the pelvis between adhesions, into the layers of the broad ligament, or into any of the neighbouring hollow viscera, most frequently perhaps the rectum.

3 A third change consists in the torsion of the tube, in the same manner as not infrequently occurs in the case of ovarian cysts. In the case of the dilated tube, however, torsion is a much rarer condition, probably owing to the manner in which the broad ligament becomes thickened by inflammatory infiltration. Fig. 77 shows an interesting specimen of this condition removed by Purefoy at the Rotunda Hospital.

Symptoms.—The symptoms caused by salpingo-oöphoritis depend, in the first instance, on whether the condition is in an acute or chronic stage. In the acute stage, the symptoms very much resemble those of acute pelvic peritonitis. The temperature and pulse-rate are high, and the abdomen is swollen, tympanitic, extremely painful, and tender over the lower portion. The patient may also suffer from occasional rigors and vomiting. Gradually—in from ten days to a fortnight—the acute symptoms subside, and the condition passes into its chronic stage. On the other hand, a general septic peritonitis may ensue due to the non-limitation of the infection by adhesions. The occurrence of abdominal pain in these cases is a sign of good import, as it usually

T° h
Pulse
abdom
Rigor
Vom

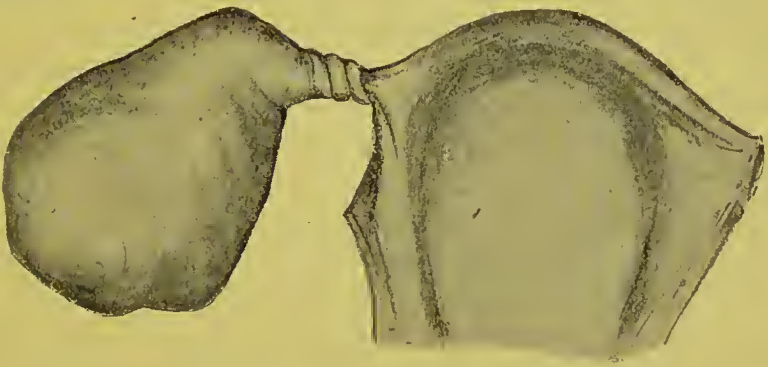


FIG. 77.—A pyosalpinx which has become twisted. ('Rotunda Hospital Report,' 1896–7.)

shows that adhesions are forming, and hence that the danger of the infection spreading to the peritoneal cavity is diminishing.

In chronic cases, the symptoms are very variable, so that it is, as a rule, impossible to make a diagnosis by their means alone. Generally speaking, they may be said to consist of a varying degree of pelvic pain, menstrual disturbance, most usually menorrhagia and metrorrhagia, and general ill-health. If both tubes are affected, sterility will result. In the case of an ✱intermitting pyosalpinx or hydrosalpinx, an escape of pus or serous fluid into the uterus will occur at intervals. If the tumour is of large size and occupying Douglas' pouch, there may be marked constipation from pressure upon the rectum.

Diagnosis.—The diagnosis of acute salpingo-oöphoritis may be made from the symptoms; it is, however, very likely to be confounded with the diagnosis of acute metritis. The pain of

Pain more limited } than in
less severe } Salp-Oöph

salpingo-oöphoritis is more severe, and the tenderness more distributed over the entire pelvis, than in metritis.

The diagnosis of chronic salpingo-oöphoritis can only be made from the results of a bimanual examination taken in conjunction with the previous history of the case. Sometimes, however, even this is not sufficient to differentiate between small ovarian cysts and inflamed and matted together appendages, as will be easily understood. In such cases, a diagnosis is only arrived at as the tumour is being removed. The characteristic points of inflamed appendages are :—

(1) In cases of salpingitis without retention, the tube is felt to be thickened reaching the size of the middle finger. It may be coiled on itself in such a manner as to include the ovary; both are then usually prolapsed to the bottom of Douglas' pouch.

(2) In cases of salpingitis with retention, *i. e.* pyo- or hydrosalpinx, the tubes and ovaries, intimately connected with one another, fill Douglas' pouch. If they have reached a considerable size, the posterior vaginal fornix is displaced downwards. On passing the finger into the rectum, the tumour is felt to be cystic in parts; and, if there is any appreciable amount of accompanying exudation into Douglas' pouch or beneath the pelvic peritoneum, the rectum will feel as if it was compressed all round by a comparatively hard and unyielding collar. This investment of the rectum is also found in cases of contracting retro-uterine hæmatocele.

(3) The tumour in Douglas' pouch is usually fixed by adhesions. In some cases, these adhesions are very friable and easily broken down; in other cases, they are extremely dense.

(4) There can usually be felt from the vagina, a groove between the tumour and the uterus; and, from the rectum, a groove between the two sets of appendages.

A pyo- or hydrosalpinx has to be distinguished from the following conditions :—

ly or never
ateral

(1) A tubal pregnancy, a hæmatosalpinx, a hæmatoma of the broad ligament, or a retro-uterine hæmatocele, especially one which has been partially absorbed.

(2) Small ovarian or parovarian cysts, particularly those which burrow between the layers of the broad ligaments.

(3) Subserous myomata of the posterior uterine wall, especially if they are complicated by the existence of pelvic peritonitis. to

(4) Coils of intestines adherent in Douglas' pouch.

A pyosalpinx is usually, though by no means invariably, bilateral; a hæmatosalpinx, hæmatoma, or tubal pregnancy, rarely or never is. Small ovarian cysts growing in the layers of the broad ligament are extremely difficult to distinguish from salpingo-oöphoritis, unless the history of the case furnishes considerable information. Subserous myomata are closely connected with the uterus, and move more readily with it.

Prognosis.—Mild attacks of salpingo-oöphoritis may get well, and leave the appendages functionally perfect. More commonly, however, the inflammation subsides leaving the fimbriated extremities of the tubes permanently obliterated, and in these cases sterility is absolute. As long as the inflammation persists, especially in cases of pyosalpinx, there is always a danger of the limiting adhesions giving way; or of the tube itself bursting, and a general peritonitis resulting. In most cases of pyosalpinx, there is attendant ill-health from the absorption of ptomaines, and there is a continual danger of a recrudescence of the acute stage owing to the contents becoming re-infected from the rectum or intestines.

Treatment.—The treatment of acute salpingo-oöphoritis is practically the same as the treatment of acute metritis. That is to say,—rest in bed, warm vaginal douches, hot applications applied over the hypogastrium, purgatives, ichthyol and glycerine plugs in the vagina—if the patient will stand the manipulations necessary to insert them, and the use of anodynes if the pain is very severe. Operative measures while the patient is in the acute stage are generally contra-indicated, on account of the danger of infecting the general peritoneal cavity, unless the patient is becoming steadily worse as the result of absorption from the tube, or unless there is a large accumulation of pus. In such cases, the pus sac should, if possible, be opened into from the vagina, and drained.

The treatment of chronic salpingo-oöphoritis falls under two heads:—

(A) Palliative treatment.

(B) Radical treatment.

(A) **Palliative Treatment.**—Palliative treatment consists in adopting such measures as will give temporary relief to the pain, will bring about a diminution of the inflammation, and will tend to correct the various displacements of the pelvic organs which may be present. It is a line of treatment which gives satisfactory results in cases in which there are no accumulations in the tubes, and in which the symptoms are not very severe. It consists, at first, in the use of hot douches, glycerine and ichthyol plugs, and anodynes. Curetting has also been recommended, and will at any rate afford relief to such symptoms as are due to the accompanying metritis. It has even been said that it cures certain cases of salpingitis by removing the swollen mucous membrane which obstructs the mouth of the tube, and so permitting a free escape for all accumulations (Poullet).

Massage is also recommended, except in those cases in which there is a cystic condition of the tubes. It may be of use as a means of stretching bands of adhesions, or of causing the absorption of inflammatory exudations by temporarily increasing the blood-supply. In cases of adherent retroversion of the uterus due to the accompanying pelvic peritonitis, a cure may be obtained in some cases by forcibly breaking down the adhesions by Schultze's method (*v.* page 336).

In cases of pyosalpinx or ovarian abscess, it may be necessary to open into the abscess sac from the vagina, evacuate its contents, and then plug the cavity with iodoform gauze. This is a less serious operation than the total removal of the appendages, but is only palliative. If it is necessary to operate on an acute case, vaginal drainage is the best mode of procedure, as it lessens the risk of causing a general infection. The subsequent extirpation of the appendages will, however, be most probably required. In chronic cases, on the other hand, preliminary drainage is rarely necessary, and a more radical treatment may usually be at once adopted.

(B) **Radical Treatment.**—The radical treatment of salpingo-oöphoritis consists in the adoption of one or other of the following lines of treatment:—

(1) The removal of the inflamed appendages.
(2) The removal of the inflamed appendages and the uterus.
(3) The performance of plastic operations on the appendages, with the object of removing the diseased

portion of the ovary, and of creating a new ostium to the tube if the fimbriated extremity has become obliterated.

(1) The removal of the inflamed appendages is the line of treatment most commonly adopted; and, if the disease is unilateral, it is undoubtedly the best. The tubes and ovaries may be removed by the abdomen or by the vagina. The latter route is suited for those cases in which the surrounding adhesions are not too dense to be easily broken down, and in which the vagina is sufficiently large to permit the necessary manipulations (*v.* page 247). Under these circumstances, it is usually not more difficult than the abdominal operation, and even if, in the course of the operation, it is found that it is impossible to remove the tubes, the danger of a subsequent abdominal operation has not been appreciably increased by what has been done. If the pus is still infective, as shown by the persistence of pyrexia, the vaginal operation is safer, as it is not attended by the same risk of setting up a general peritoneal infection. As a rule, it will be found easier to remove the tumour by posterior than by anterior colpotomy (*v.* page 395), as the shortening of the infundibulo-pelvic ligament, which is generally found in inflammatory cases, renders it very difficult to draw the ovary sufficiently far down through the anterior fornix to permit of the ligation of the ovarian vessels.

If the enlarged appendages extend high into the abdominal cavity, and especially if there is reason to believe that there are intimate adhesions between them and the intestines, the abdominal route is the better, unless it is decided to perform Landau's radical operation and to remove the uterus as well.

(2) The removal of the uterus in addition to the removal of the inflamed appendages is strongly recommended by Landau, Péan, and others, on the ground that in cases of bilateral disease of the appendages, the uterus is also so much diseased that, if it is not removed, the patient is only half cured; while, subsequent to removal of the appendages, its retention is not of any benefit to the patient. The removal is carried out *per vaginam* (*v.* page 359).

(3) Conservative operations, with the object of retaining a portion of the ovary, and of restoring if possible the abdominal ostium of the tube, are indicated in suitable cases when the dis-

ease is bilateral. Resection and ignipuncture of the ovary (*v.* page 390) are indicated—the former, where it is possible to leave a healthy portion of ovary behind, the latter, in the case of multiple small cysts. It is proved beyond doubt, that the retention of even the smallest portion of normal ovarian tissue is a factor of importance in assuring the future comfort of the patient. The restoration of an abdominal opening to the tube—*salpingostomy*—is indicated in patients in whom it is desirable to make every attempt to overcome the sterility which necessarily results from the obliteration of the ostia on both sides. There is, however, a certain amount of risk in its performance, as, if the contents of the tube are not sterile, their escape may set up a septic peritonitis. These operations can be carried out by the abdominal or by the vaginal route (*v.* page 247).

NEW GROWTHS OF THE TUBES.

The benign neoplasms of the tubes are few in number, and are not of any great clinical importance. Myoma, papilloma, adenoma, are all said to occur. A myoma of the tube will probably not cause any symptoms. Papilloma and adenoma cause an enlargement of the tube which very closely resembles a pyosalpinx. An adenoma is also said to cause free fluid in the abdominal cavity (Bland-Sutton).

Such cases will only be recognised after removal of the appendages, or during the operation itself. As their removal is the correct treatment, the actual diagnosis of the case prior to the operation is not a matter of great importance.

The malignant growths of the tubes are equally rare. Instances of primary sarcoma and carcinoma have been recorded. Secondary involvement of the tubes by extension from the uterus or ovaries may sometimes occur, but even this is not very common. If there is any reason to suspect the existence of malignant disease, an exploratory abdominal cœliotomy should be performed, with the object of ascertaining the exact condition of affairs.

TUBERCULOSIS.

Tuberculosis of the Fallopian tubes is, perhaps, the commonest form of primary tuberculosis met with in women, if pulmonary tuberculosis is excluded. It usually occurs as a primary condition, but may also be the result of extension from the uterus or ovaries. Tuberculosis is the commonest cause of pyosalpinx in virgins.

Pathological Anatomy.—Macroscopically, there is little or nothing to distinguish between septic or gonorrhœal and tuberculous inflammation of the tube. The latter is always enlarged, and is either cystic, or not, according as the ostia are or are not obliterated (*v.* Fig. 78). Microscopically, the walls of the tube are found to be the seat of typical tuberculous lesions. Koch's bacillus may be found either in the sections or in the contents of the tubes, but it is not always easy to determine its presence.

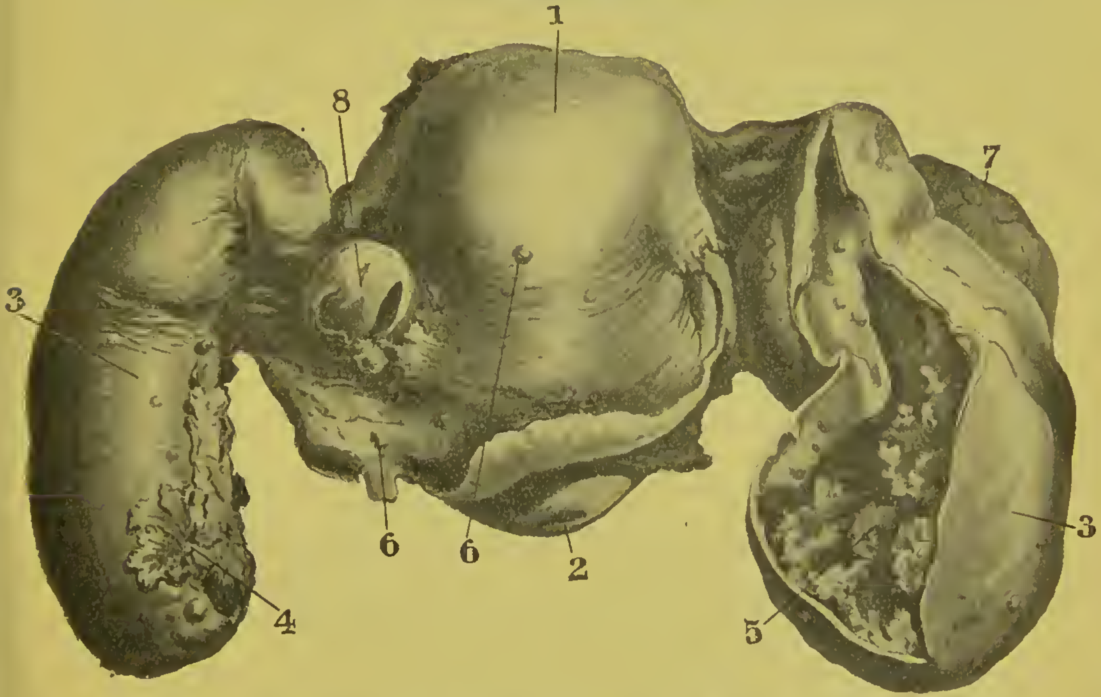


FIG. 78.—Double salpingo-oöphoritis, the result of tuberculosis. 1. Fundus uteri. 2. Cervix. 3, 3. The distended tubes. 4. Fimbriated extremity of the left tube. 5. Right tube opened to show cheesy deposit in its interior. 6, 6. Tubercles beneath the peritoneum. 7. Enlarged ovary on the right side. 8. Mass of breaking-down tubercular material. (*Roberts.*)

Treatment.—Tuberculous tubes should always be removed completely. The fact that their occurrence is so common is a strong reason for the early removal of all cases of pyosalpinx. If the uterus or ovaries are also involved, they must be removed as well.

TUBAL PREGNANCY.

Tubal pregnancy can hardly be said to be a disease of the tubes, though in all probability its occurrence is permitted by inflammatory conditions of the tubes associated with incomplete blocking of the ostia. As it must be considered an obstetrical rather than a gynæcological condition, it will be more correctly discussed in books of the former nature.

Torsion of Pedicle of Ovarian Cyst
Pain Vomiting Collapse

CHAPTER XI.

DISEASES OF THE OVARIES.

Displacements of the Ovaries—Undescended Ovary—Hernia of the Ovary—Ascent of the Ovary—Descent of the Ovary—Varieties, Ætiology, Symptoms, Diagnosis, Treatment. Inflammatory Diseases of the Ovary. New Growths of the Ovary—Cystic Tumours of the Ovary—Varieties, Ætiology, Symptoms, Diagnosis, Prognosis, Treatment. Solid Tumours—Fibroma—Sarcoma — Carcinoma — Symptoms, Treatment. Tuberculosis of the Ovary.

THE following are the various pathological conditions of the ovary:—

Displacements.
Inflammatory diseases.
New growths.
Tuberculosis.

DISPLACEMENTS OF THE OVARY.

The normal position of the ovary is thus described by Schultze:—"The ovaries lie close to the uterus on either side within the true pelvis, their long axes . . . . . parallel to the lateral wall of the pelvis, and nearly so to the median plane. They . . . . extend upwards from the uterus, their lateral attachments to the brim of the pelvis being higher than their connections to the uterus. They lie with their superior extremities in the plane of the pelvic inlet, close beneath the inner edge of the ileo-psoas muscle, which, when in momentary contraction, is the best guide for the external hand in bimanual palpation of them."

Under the head displacements of the ovary, four conditions are included:—

(A) Undescended ovary.
(B) Hernia of the ovary.
(C) Ascent of the ovary.
(D) Descent or prolapse of the ovary.

(A) **Undescended Ovary.**—The ovaries, as the testicles, are found in the embryo close to the kidneys, from which position they gradually descend to their normal site. The non-occurrence, or the arrest, of this process of descent will give rise to the condition known as undescended ovary, and, as a result, the latter may be found anywhere between the kidneys and the pelvic brim. As also sometimes happens in the case of non-descent of the right testicle, non-descent of the right ovary may be accompanied by a non-descended condition of the cæcum into the right iliac fossa (Bland-Sutton).

(B) **Hernia of the Ovary.**—Ovaries, either alone, or in company with the tube, intestines, or omentum, may be found in the sac of an inguinal, femoral, or obturator hernia. Hernia of the ovary alone is known as an *oöphorocele,* of both ovary and tube as a *salpingo-oöphorocele,* and of the tube alone as a *salpingocele.* Accidents common to the more usual forms of hernia, as strangulation, etc., may occur in these cases, and hence some form of radical cure should as a rule be adopted.

(C) **Ascent of the Ovary.**—Ascent of the ovary as a pathological condition is due to:—

(1) Tumours of the ovary.
(2) Tumours in Douglas' pouch, or of the broad ligament, so situated as to push the ovary upwards.
(3) Tumours of the uterus, as myomata.
(4) The formation of peritoneal adhesions round the ovary or fimbriated extremity of the tube during pregnancy, which prevent these structures from returning to their normal position as the uterus involutes.

Ascent of the ovary is not a condition of very great clinical importance. Its treatment is that of the condition which causes it.

(D) **Descent of the Ovary.**—Descent or prolapse of the ovary is met with in four varieties (Munde):—

(1) Retro-lateral prolapse.

(2) Retro-uterine prolapse.
(3) Ante-uterine prolapse.
(4) Prolapse into the infundibulum of an inverted uterus.

The last two varieties may be dismissed, as they are only of importance from their cause. Ante-uterine prolapse is the result of the formation, and subsequent skrinkage, of adhesions which tend to drag the ovaries into the anterior peritoneal pouch. Prolapse into the infundibulum of an inverted uterus is the occasional concomitant of the inversion, and is in itself of no importance.

The first two varieties are really only different stages in the course of the same displacement, and may therefore be discussed at the same time. By retro-lateral prolapse, is meant the descent of the ovaries into the sub-ovarian fossa, and consequently in this degree they have not passed over the utero-sacral ligaments. By retro-uterine prolapse is meant that the ovaries are lying in Douglas' pouch, and so have passed over the utero-sacral ligaments. It is to these conditions that the term prolapsed ovary is usually applied.

Ætiology.—The causes of prolapse of the ovary fall under two heads:—

(1) Causes situated in the ovary or its ligaments. These are,—relaxation of the ligaments, and increase in the size of the ovary from any cause.
(2) Causes situated outside the ovary. These are,—retrodeviations of the uterus, pelvic peritonitis, and tumours pressing downwards.

Symptoms.—If the prolapsed ovary is associated with, or caused by, some other morbid condition, its symptoms are to a great extent masked or overshadowed by the symptoms of the accompanying condition. The symptoms met with in ovarian prolapse, which are the direct result of such a condition are,—more or less well-marked dyspareunia, and tenderness when a vaginal examination is made, both, in proportion to the amount of inflammation which is present in the ovary. The degree of dyspareunia may be so great as to cause relative sterility. There may be also extreme pain when the bowels move, or during walking.

Diagnosis.—The symptoms call attention to the possibility of the presence of this condition. Then, on making a vaginal examination, a round or oval tender swelling is found behind or slightly to one side of the uterus about the level of the internal os or at the bottom of Douglas' pouch. This swelling can be best felt by recto-vaginal examination, whilst by bimanual examination we can determine the fact that the tubes are healthy, and that one or other ovary is missing from its normal place. A prolapsed ovary may be confused with a subserous myoma growing from the posterior uterine wall, a cystic tube, a loop of intestine adherent in Douglas' pouch, and a tender retroflexed uterus.

Treatment.—The treatment consists in removing—as far as possible — any condition which may favour the prolapse of the ovary, as retro-deviations of the uterus, tumours, etc., i.e. Sau and in adopting measures calculated to remove the accompanying inflammation — ichthyol plugs, hot vaginal douches, etc. If adhesions are present and are the cause of the prolapse, the ovary may be shelled out in very much the same way as in Schultze's method of breaking down uterine adhesions (*v.* page 336), or, if that cannot be done, some relief may be obtained by means of massage. If there are small cystic tumours present, the diseased portion of the ovary or the whole ovary may be removed by vaginal cœliotomy, and adhesions broken down at the same time. In those cases in which the prolapse is due to elongation of the ovarian ligaments, an operation having for its end the shortening of the infundibulo-pelvic ligament was proposed by Imlach of Liverpool.

INFLAMMATORY DISEASES OF THE OVARY.

Inflammatory diseases of the ovary have been already fully discussed under the heading Salpingo-oöphoritis (*v.* page 158).

NEW GROWTHS OF THE OVARY.

Before entering into the varieties of ovarian new growths, it is well to understand the nature of the ovary in its relationship to these structures (*v.* Fig. 79). "Morphologically, the ovary consists of two parts :—that which forms its free surface is the egg-bearing part, and is called the oöphoron (ὠόν, an egg ; φορέω, I bear) ; the part in relation with the mesometrium is the paroöphoron (παρά, beside ; ὠον ; φορέω), and represents the degenerated remains of the glandular part of the mesonephros.

It contains no follicles, but is rich in blood-vessels" (Bland-Sutton). All those cysts which originate in a Graafian follicle (*i. e.* in all probability all ovarian cysts) will accordingly start in the oöphoron. It is said, that papillary cysts may also start in the remains of the mesonephros in the par-oöphoron. Solid connective-tissue tumours can arise from any part of the ovarian stroma, while carcinoma probably always starts in the oöphoron.

The new growths of the ovary may be divided into :—

I. Cystic tumours.
II. Solid tumours.

The allocation of the various tumours to one or other of these groups is somewhat arbitrary; as in some cases tumours which are classified as cystic may, owing to an overgrowth of their tissues, become solid; whilst, on the other hand, a tumour usually classified as solid may, owing to the breaking down of its tissue, become cystic. The allocation is made according to the form the tumour takes at the commencement of its growth, and independently of any secondary change which may take place in it.

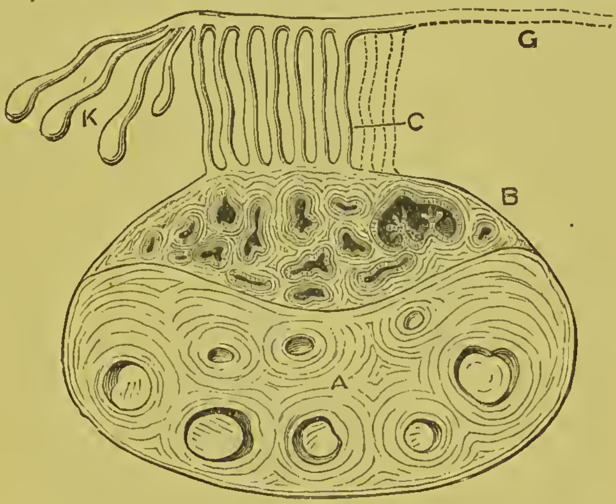


Fig. 79.—Diagram of the ovary and parovarium showing the relationships of the oöphoron and par-oöphoron. A. Oöphoron. B. Par-oöphoron. C. Vertical tubules of parovarium. K. Kobelt's tubes. G. Gärtner's duct. (*Bland-Sutton.*)

I. CYSTIC TUMOURS OF THE OVARY.—Cystic tumours of the ovary are very much more common than are solid tumours. The following varieties of them are met with :—

(A) Mucoid cysts
- Simple cysts.
- Proliferating adenomatous cysts.
- Proliferating papillary cysts.

(B) Dermoid cysts.

(C) Mixed mucoid and dermoid cysts.

(A) **Mucoid Cysts.**—Mucoid cysts are the commonest forms of cysts of the ovary. They are distinguished from dermoid cysts by the fact that their epithelial lining is composed of mucoid cells—usually cylindrical—whilst dermoid cysts are lined by cells derived from the ectodermal layer, *i. e.* compound squamous epithelium. Three forms of mucoid cyst are met with :—

(1) A simple cyst, consisting of a single loculus, and usually the result of the accumulation of fluid in a Graafian follicle. Several such cysts may be found in the same ovary (*v.* Fig. 80).

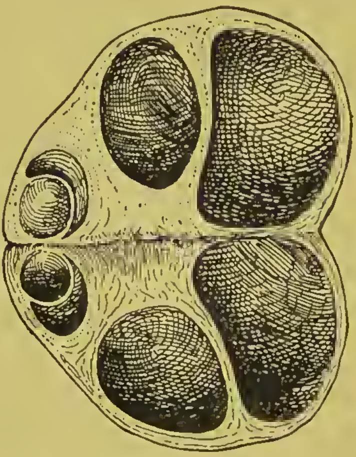


FIG. 80.—Multiple simple cysts of the ovary, or hydrops folliculorum.

(2) A proliferating adenomatous cyst, consisting of numerous smooth-walled cavities of varying size, and filled with a fluid of varying consistency (*v.* Fig. 81).

(3) A proliferating papillary cyst consisting also of numerous cavities filled with fluid, and into which project wart-like prominences that on microscopical examination are found to be of a papillary nature (*v.* Fig. 82).

(B) **Dermoid Cysts.**—Dermoid (δέρμα, the skin; εἶδος, a likeness) cysts are characterised by possessing a lining of cells derived from ectodermal cells. They may also contain other ectodermal structures, as hair, teeth, sebaceous glands, and

squam

nails, and, in addition, traces or even large quantities of tissues resembling almost any of the structures of the body (*v.* Fig. 84). Amongst these may be mentioned cartilage, bone, liver, mucous and mammary glands, and smooth muscle-fibre. Dermoids are usually of a comparatively small size, and rarely exceed that of a fœtal head.

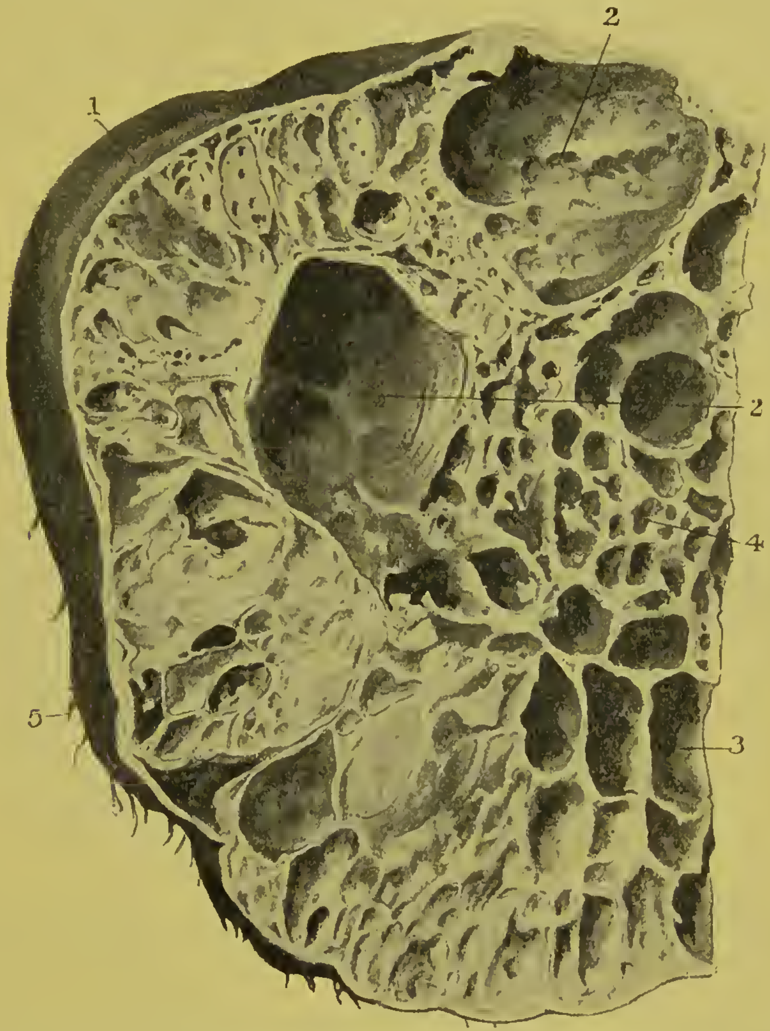


Fig. 81.—Portion of a proliferating adenomatous cyst of the ovary. 1. Outer surface of main cyst wall. 2, 2. Large secondary cysts. 3, 4. Smaller cysts. 5. Adhesions on the surface of the main cyst. (*Roberts.*)

(c) **Mixed Mucoid and Dermoid Cysts.**—Mixed mucoid and dermoid cysts are occasionally met with. They are composed of several loculi, some of which have the characteristics of a mucoid, others of a dermoid cyst.

Ætiology.—Two theories have been suggested to account for the origin of mucoid cysts:—

(1) That they are congenital in origin, and are due to the inclusion in the ovary of a cluster or clusters of germinal epithelium, which do not go to form Graafian follicles in the ordinary manner, but are included in the ovary as "resting embryonic epithelium." This epithelium develops at a later date, and by its proliferation and secretion forms a cyst (Waldeyer, De Sinéty.)

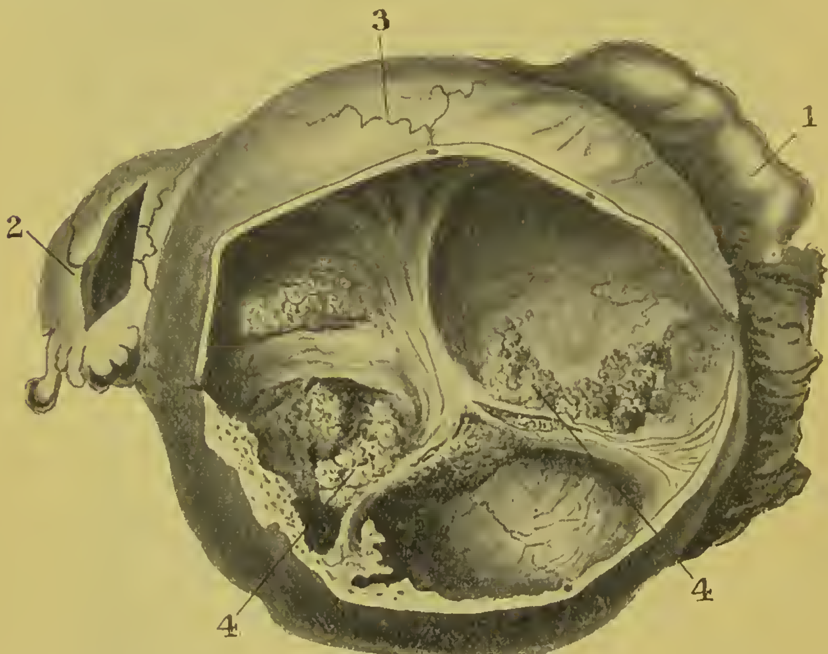


Fig. 82.—A proliferating papillary cyst of the ovary. 1. Uterine end of Fallopian tube. Below is the cut surface of the broad ligament. 2. Fimbriated extremity. The tube which was dilated has been opened. 3. The cyst with septa in its interior. 4, 4. Papillomatous masses. (*Roberts.*)

(2) That they have their origin in a Graafian follicle, the epithelium of which has for some reason commenced to proliferate and secrete.

The second theory appears to afford the most probable explanation. If the germinal epithelium can take on generative action and form a cyst, there seems to be no reason why the epithelium of the follicle—which is derived from the germinal epithelium—should not also take on action and so be the starting-point of a cyst (Steffeck). Accordingly, it is probable that a mucoid cyst is in all cases derived from germinal epithelium, either directly, or, more usually, indirectly through the epithelial lining of a Graafian follicle. From some cause, the epithelial lining of the follicle commences to secrete fluid, this fluid accumulates, the follicle distends, and becomes a cyst.

If the assumption of the power of secreting is the only change which takes place, the resultant condition is a simple or unilocular cyst. The contained fluid is thin, clear, and straw-coloured, with a specific gravity of 1005 to 1026. Occasionally, it may be tinged with blood, owing to the rupture of a small blood-vessel in its walls. The commonest example of this is the cystic dilatation of a Graafian follicle known as *hydrops folliculi* (*v.* Fig. 80). Similar cysts may also form in a corpus luteum. If, however, in addition to secreting, the epithelium lining the follicle proliferates, a so-called proliferating cystic tumour of the ovary results. This tumour is always multilocular, even in those cases in which, to the naked eye, there appears to be only one cavity. As the epithelial lining proliferates, it

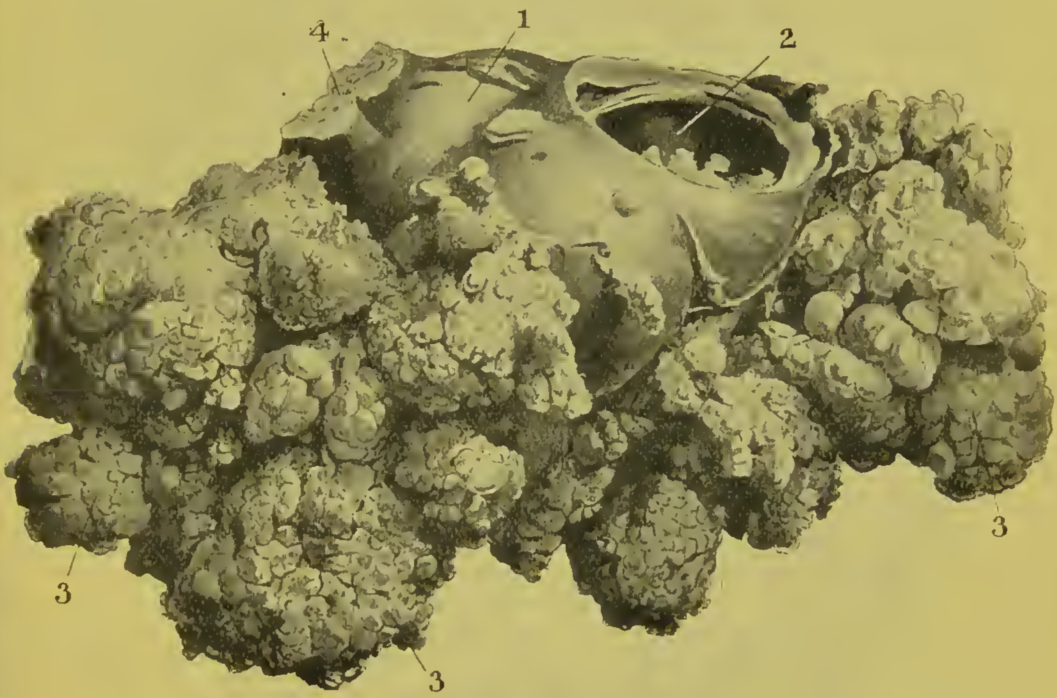


Fig. 83.—A proliferating papillary cyst of the ovary, in which the papillary masses have made their way through the cyst wall. 1. Remains of ovary partially converted into a cyst, which has burst. 2. Cystic portion of ovary, its interior is filled with papillomatous growth. 3, 3, 3. Papillomatous masses in which the ovary is embedded. Many of these have sprouted through the cyst wall. 4. Pedicle. (*Roberts.*)

may either grow outwards into the connective tissue of the cyst wall and there form diverticula (*v.* Fig. 85); or, if the activity of the epithelium is sufficiently great, it may project into the interior of the cyst in the form of little ridge-like elevations (*v.* Fig. 86). In the former case, the condition is known as a *proliferating adenomatous or glandular cyst;* in the latter case, as a *proliferating papillary cyst.*

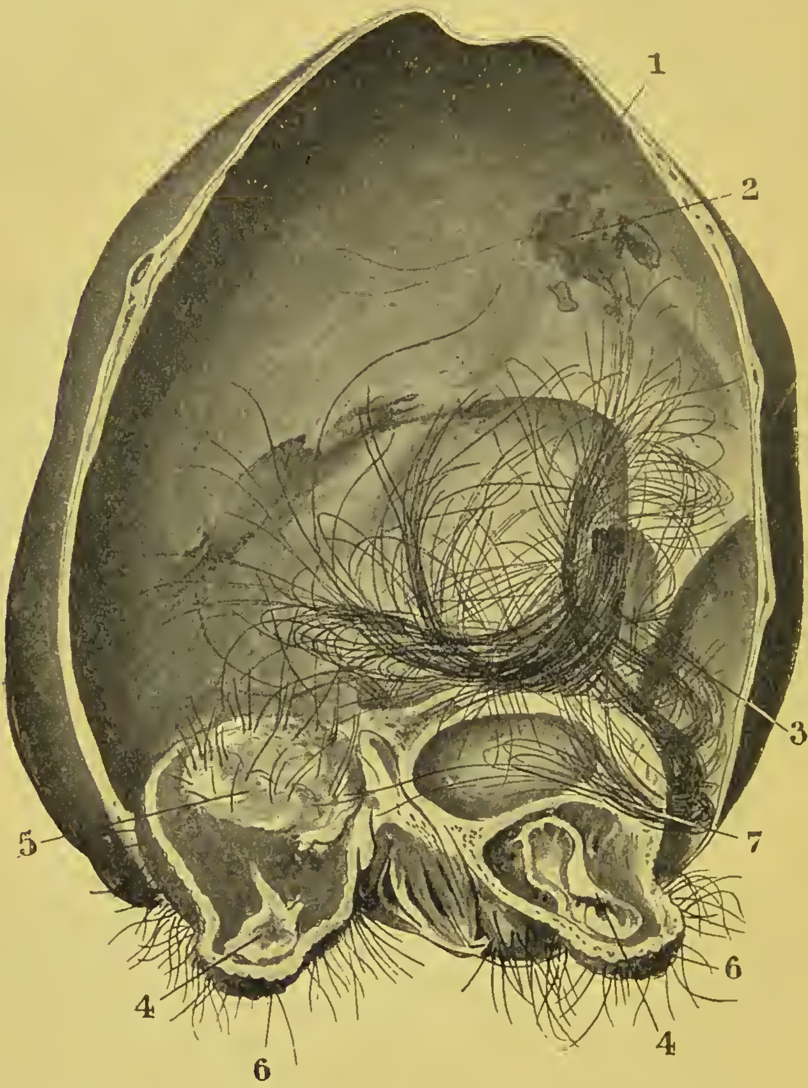


Fig. 84.—A dermoid cyst of the ovary. 1. Main cyst wall. 2. Plates of calcareous material. 3. Long masses of hair. 4, 4. Bony plate contained in a nipple-like process, which has been cut in half. 5. Pad of fatty material fitting into a hollow (7) on the opposite side. 6, 6. Extremity of the so-called nipple, covered with true skin and hair. (*Roberts.*)

The aspects, under which proliferating adenomatous cysts appear, are very numerous, and consist in all the varieties between a smooth-walled apparently unilocular cyst, and an almost solid tumour of a sponge-like structure. Without going into a full description of them, it may afford some assistance in understanding them to give, shortly, the factors which determine so great a variety of forms :—

(1) If the rapidity of cell secretion and of serous transudation is greatly in excess of the rate at which the epithelium proliferates, a cyst is formed, with thin smooth walls, which is only distinguishable from a simple cyst by the facts that it is usually much larger, and that if carefully examined smaller cysts will be seen in its walls. If the walls are examined microscopically, the epithelium which usually lines the interior of these cysts may be found to be completely wanting, or to have disappeared in parts. This, and the fact that the cyst is

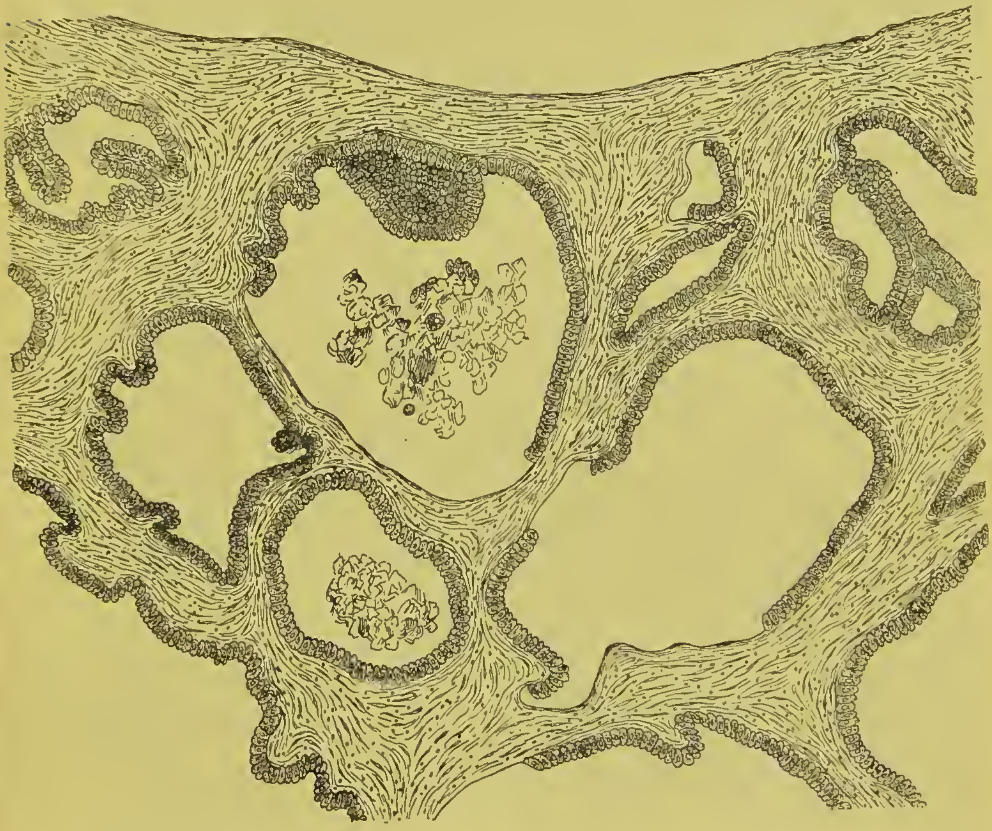


Fig. 85.—Proliferating glandular cyst of ovary. Section through the wall. (*Wyder.*)

usually composed of one large cavity, are due to what may be called pressure atrophy, *i. e.* atrophy of the cells, and of the dividing septa between the different loculi of the cyst, owing to the pressure exerted upon them by the fluid.

(2) If the cellular proliferation proceeds at a quicker rate than does the accumulation of fluid, then the proportion of cyst wall to fluid contents is increased, and a tumour—multilocular —is formed, in which comparatively thick walls divide cavities of various sizes, and are themselves honeycombed with other and still smaller cavities.

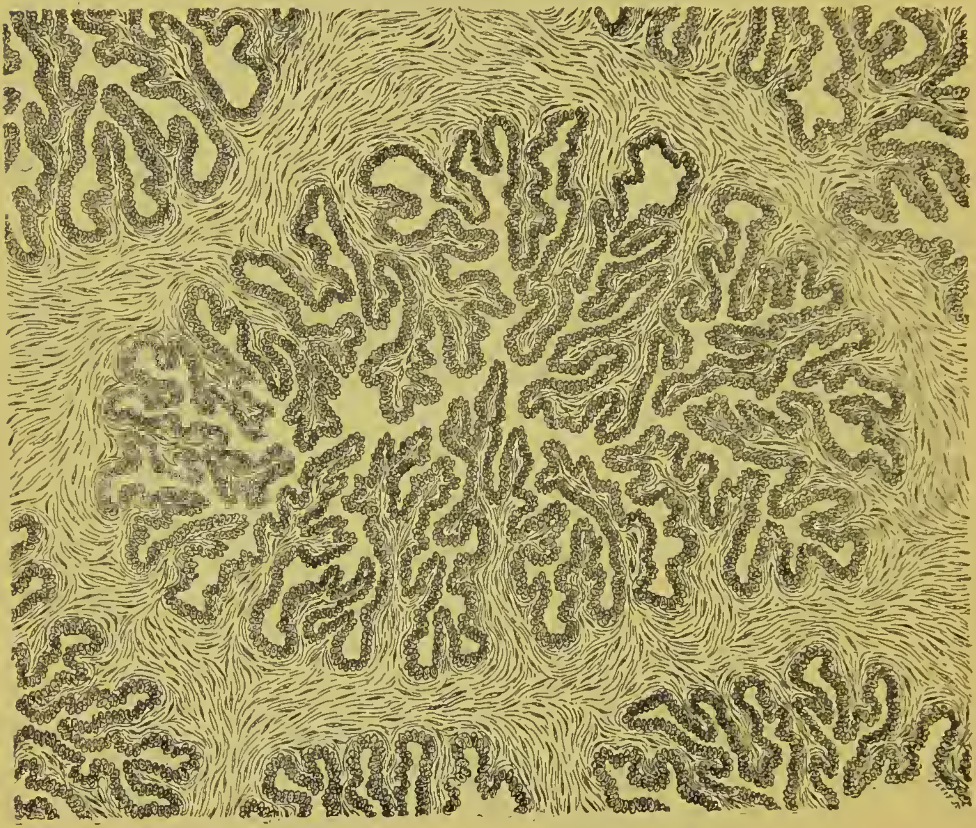


FIG. 86.—Proliferating papillary cyst of ovary. Section through the wall. (*Wyder.*)

The following sentence describes this condition very well:— "Secondary pouches (with fluid contents) form on the surface and in the walls of the large cyst; secondary and tertiary generations grow out, masses of areolar tissue add themselves here and there, and so come to render more complex this singular variety of ovarian degeneration. According as the amount of areolar tissue, and the number, size, and distribution of the pouches are varied, so all the different forms which have been described are obtained" (Quénu).

(3) If the activity of the mucoid cells lining the interior of the cyst is considerable, the contents are thick and ropy owing to the presence of pseudo-mucin. If, on the other hand, their activity is slight and the accumulated fluid is, in the main, the result of serous transudation, the fluid is thin and limpid, and contains no pseudo-mucin. As a rule, it is also found that a lining of cylindrical ciliated epithelium is associated with thin limpid contents, a lining of cylindrical non-ciliated epithelium with thick mucus-like contents (Gebhart).

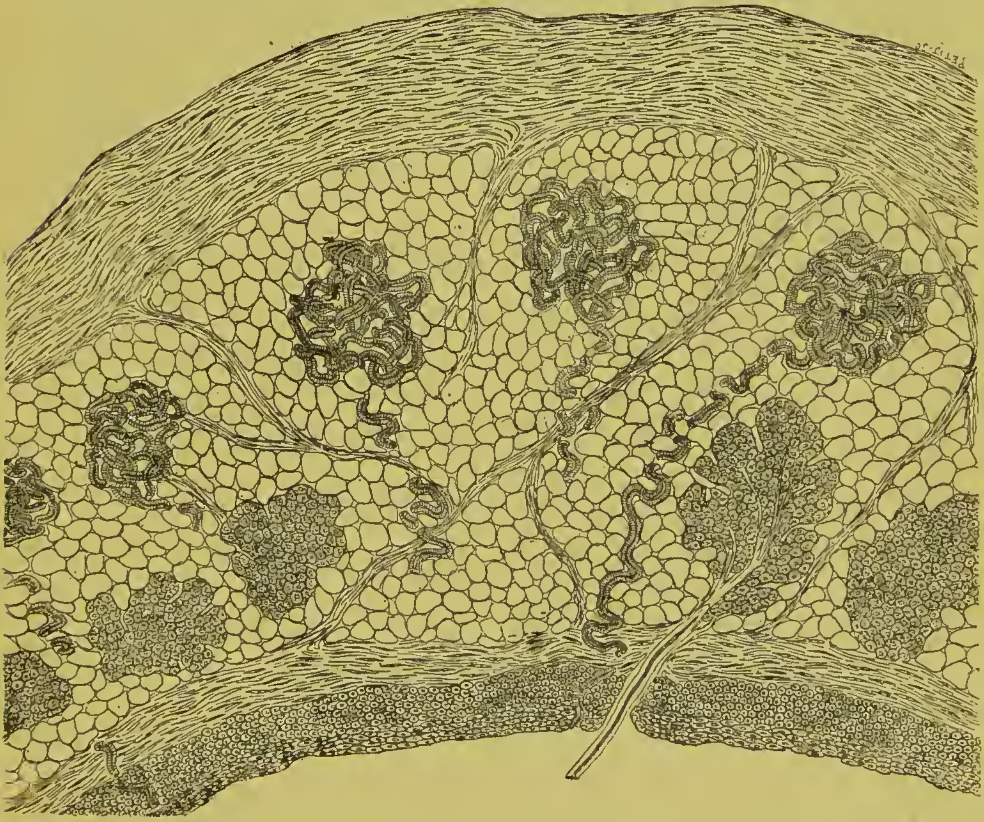


FIG. 87.—Dermoid cyst of ovary. Section through the wall. (*Wyder.*)

Proliferating papillary cysts are luckily much rarer than proliferating glandular cysts. The essential difference between them is, that in the papillary cysts the activity and power of growth of the epithelium is very much more marked than in the glandular cyst. This results in the outgrowth of epithelial vegetations on the cyst wall, and in the great tendency to take on malignant action which these cysts possess. The variations in form and size are also very numerous, but the enormous size which is sometimes found in the case of adenomatous cysts is not reached. The papillary groups of epithelial cells, which first appear on the interior of the cysts, afterwards tend to grow outwards on to the exterior, and from it they may invade the peritoneum (*v.* Fig. 83). From the commencement of peritoneal invasion, the history of the case is one of malignant disease.

It is probable that papillary cysts may sometimes arise in the degenerated remains of the glandular portion of the mesonephros (Wolffian body) which constitute the par-oöphoron.

Several theories have also been brought forward to explain the origin of dermoid cysts :—

(1) That they are due to the inclusion of a portion of ectoderm in the ovary, at a time at which the latter lies close to the former (Verneuil, Lannelongue). This theory, while it serves to account for the presence of ectodermal structures in these tumours, does not in the least account for the presence of the various structures which are found which are not ectodermal in origin.

(2) That they are instances of parthenogenesis (ovular development without impregnation), that is to say, that an ovule takes on growth *per se* and develops an atypical incomplete embryo—in which many of the ordinary tissues of the body are represented whilst others are not, such tissues being arranged in no recognised order but grouping themselves haphazard (M. Duval). In support of this theory come the facts that parthenogenesis is a common occurrence in lower orders of insect life, and that if the process is continued for too many generations the offspring deteriorates ; that segmentation without fertilisation has been observed in the ovule (Morelle) ; and that a very small dermoid tumour has been seen in the centre of a Graafian follicle (Steinlin). Such a theory also helps to explain those cases in which mixed mucoid and dermoid tumours are found, on the ground that proliferation takes place of the epithelium of a Graafian follicle in which a dermoid tumour was developing.

(3) That a dermoid is derived from a cell called a "nodal

cell," which has been lying latent up to the time of the formation of the tumour. Bard, who was the originator of this theory, applies the term "nodal cell" to the cells of the ovule prior to the differentiation of the three layers of the embryo. As these layers are derived from these "nodal cells," each cell must apparently have the power of developing different tissues. Such a theory would explain those cases in which dermoids, containing tissues other than ectodermal, have been found in other parts of the body than the ovary.

Mixed tumours have been best explained by the supposition of the parthenogenetic origin of dermoid tumours, as has been described.

Symptoms.—The symptoms due to the presence of ovarian cysts may be generally stated to consist of the following :—

(1) Menstrual disorders. These are very variable in the form they take. They consist sometimes, and perhaps most frequently, in the occurrence of slight menorrhagia and metrorrhagia, and dysmenorrhœa ; more rarely—in those cases in which the ovarian tissue is completely destroyed—in amenorrhœa.

(2) Pressure symptoms. The extent of the pressure symptoms depends upon both the size and the situation of the tumour. Very large tumours cause serious pressure upon the heart, lungs, stomach, and intestines, and so give rise to cardiac palpitations and perhaps failure, pulmonary dyspnœa, vomiting, and intestinal atony. Smaller tumours, on the other hand, which become impacted in the pelvic cavity, may cause severe pain from pressure upon the sacral nerves, and interference with the functions of the bladder and rectum.

(3) Constitutional disturbances. These consist in the occurrence of dyspepsia, debility, insomnia, and such reflex disorders.

Diagnosis.—The diagnosis of a small ovarian tumour has to be made from cystic enlargement of the tube and subperitoneal myomata of the uterus. This can as a rule be best accomplished by means of a bimanual examination, unless the tumour is very small, when it can possibly be best made by an abdomino-recto-vaginal examination. The characteristic marks of a small or medium-sized ovarian tumour are as follows :—

(1) A tumour is felt, distinct from the uterus but connected

with it by means of a pedicle, and situated in the neighbourhood of one or other ovary.

(2) The ovarian ligament runs into the tumour (*v.* Fig. 88).

(3) An ovary can be felt on one side, and only the tumour on the other.

In the case of a large tumour which fills the entire abdomen, it is more difficult to arrive at a correct diagnosis. Such a tumour may be confounded with a fibro-cystic tumour of the uterus, a pregnant uterus, a collection of ascitic fluid, a large cystic kidney, an enlarged spleen, and an extra-uterine pregnancy at or near full term. The diagnosis of a large ovarian tumour can be made by noting the following points:—

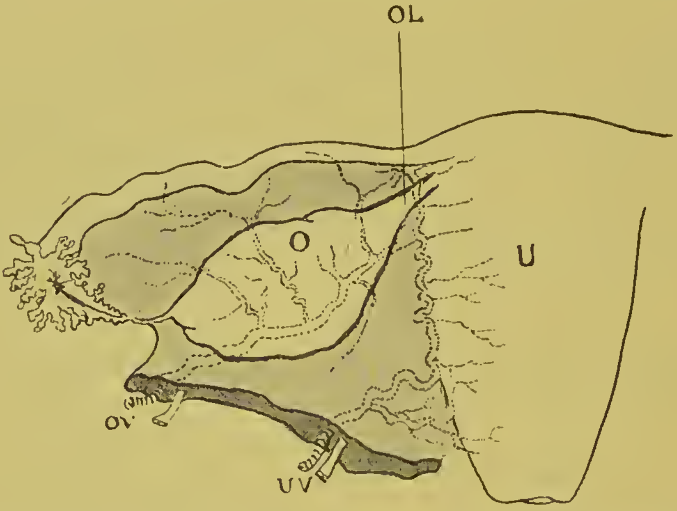


Fig. 88.—Posterior view of the broad ligament, showing the blood-supply and the attachments of the ovary. o. Ovary. ol. Ovarian ligament. ov. Ovarian vessels entering through the infundibulo-pelvic ligament. uv. Uterine vessels. u. Uterus.

(1) The history of the case will show that the tumour has grown upwards from the pelvic brim, and not downwards from the region of the kidney or spleen. Tumours of renal or splenic origin grow downwards.

(2) The outlines of the tumour are distinct, and, if the abdomen is percussed, it will be found to be dull in the centre and resonant round the sides. In ascites, there is no well-marked outline unless the fluid is encysted, and the sides are usually found to be dull while the centre is resonant.

(3) As in the case of a small cyst, the most reliable point is

the noting that the tumour is distinct from the uterus, but that it is connected with it by means of a pedicle. The pedicle of an ovarian tumour can usually be felt in the following manner:—Seize the cervix in an American forceps, and insert the middle finger into the rectum and the index finger into the vagina. Get an assistant to draw the uterus well down within reach, and pass the rectal and vaginal fingers upwards at one or other side of the uterus, in such a manner, that they enclose the broad ligament between them. Lastly, get an assistant to push the tumour upwards towards the diaphragm; the fingers will then feel the pedicle tightening—if there is one—and, when the assistant allows the tumour to fall back again, the pedicle will be felt to relax. The determination of the fact that the tumour is distinct from the uterus will at once exclude the possibility of intra-uterine pregnancy, and will almost exclude the possibility of a fibro-cystic tumour of the uterus.

If it is not possible to separate the tumour from the uterus, even when the examination is made under an anæsthetic, pregnancy and fibro-cystic tumours must be excluded as far as possible by the symptoms of the patient. This is as a rule easy to do in cases of pregnancy, in which the differential diagnosis is most important. In cases of doubt, a positive diagnosis can always be obtained by waiting. Fibro-cysts of the uterus are more difficult to distinguish; but, in their case, the importance of an accurate diagnosis is not so marked, and doubts can be cleared away by an exploratory cœliotomy. The same remark applies to cases of extra-uterine gestation after term; before term the symptoms of the case are usually sufficient.

Prognosis.—The prognosis of a cystic ovarian tumour, which is not removed, is very bad. Death will be brought about in one of the following ways:—

(1) By the pressure the tumour exerts on vital organs, notably on the heart causing its failure; on the intestines causing obstruction; on the ureters causing uræmia; on the lungs causing impeded respiration and œdema.

(2) By the toxic effect the absorption of its contents may have.

(3) By putrefaction or suppuration occurring in the tumour. Either of these may occur as the result of, or independently of, twisting of the pedicle.

(4) By rupture of the cyst wall and consequent fatal peritonitis or hæmorrhage.

(5) By obstructing labour, and so causing rupture of the uterus.

(6) By causing metastases, if malignant, in other organs or on the peritoneum.

Papillary cysts of the ovary are, with the exception of actual malignant growths, the most dangerous of ovarian tumours, as, once the papillary masses have burst through their capsule, the rest of the history of the case is the same as that of malignant disease.

Treatment.—All cystic tumours of the ovary must be removed, as it is impossible to determine whether they are of a harmless nature or not without doing so. Removal may be effected in the case of small cysts through the vagina (*v.* page 247), in the case of large cysts through the abdominal wall (*v.* page 385). The only form of ovarian cyst, which may be left alone with safety, is a simple cyst. It is, however, unfortunately impossible to tell with certainty that a cyst is a simple cyst without removing and examining it carefully.

Aspiration of the contents of ovarian cysts as a means of cure is a practice which is not infrequently resorted to, although it has been condemned by all modern authorities. Aspiration, or tapping, never effects a cure. On the contrary, if the tumour is malignant, it renders dissemination of its contents through the peritoneal cavity more likely. Further, every time a cyst is tapped, adhesions may be formed between the cyst and the abdominal wall; and so a case, which at the commencement may have been uncomplicated, may be rendered most complicated. Tapping of a cyst is only permissible under one condition:—If a patient is dying from cardiac failure due to the pressure of a cyst, tapping may be resorted to with the object of removing the urgent symptoms of the case and bringing the patient into a condition more suitable for operation. Tapping of the peritoneal cavity may be sometimes necessary, in cases complicated by ascites, in order to clear up the nature of the case.

SOLID TUMOURS OF THE OVARY.—The solid tumours of the ovary which are met with are the following:—

(A) Fibroma.

(B) Myoma.
(C) Sarcoma.
(D) Carcinoma.

(A and B) **Fibroma and Myoma.**—The fibroma and the myoma are both rare tumours in this region, especially the myoma. When the latter occurs, it is found to consist of unstriped muscle tissue with which there may sometimes be a mixture of fibrous tissue. Both occur as encapsuled tumours, and in this way may be distinguished from sarcomata which infiltrate the ovary generally.

(C) **Sarcoma.**—Sarcoma of the ovary occurs from infant life up to puberty, and also between the ages of twenty-five and forty-five (Bland-Sutton). It may reach a comparatively large size, and is usually composed of a mixture of spindle and round cells. If one ovary is affected, the other will probably be also attacked. Sarcoma rapidly generalises itself and proves fatal. Cystic degeneration of these growths is very common, and, frequently, hæmorrhages take place into the cavities thus formed.

(D) **Carcinoma.**—Carcinoma of the ovary as a primary condition is by no means so uncommon as it is sometimes stated to be. It is the most common form in which malignant disease attacks the ovary, and not infrequently arises in a mucoid cyst. Secondary deposits occur consecutive to carcinoma of the breast, the uterus, and the pylorus; in such cases both ovaries are often affected (Bland-Sutton). Cystic degeneration of these tumours may occur, and involvement of the retro-peritoneal glands takes place at an early stage.

Symptoms.—The symptoms, which solid tumours of the ovary give rise to, are the same as those which have been described under the head of cystic tumours. In the malignant forms, ascites is very common, and, as the growth spreads, all the pelvic contents are involved and compressed. As these forms become generalised, the usual symptoms of malignant disease appear as well.

Treatment.—The methods of diagnosing the nature of the enlargement are the same as in the case of cystic tumours. The treatment is also similar; that is, the tumour must be removed, unless, as in the case of advanced malignant disease, it is obviously impossible to remove the entire growth. In cases of sarcoma, it is always advisable to remove both ovaries.

TUBERCULOSIS OF THE OVARY.

Tuberculosis of the ovary very rarely occurs as a primary condition, and is more frequently secondary to tuberculosis of the tubes (*v.* Fig. 78) or of the peritoneum, or, more rarely, is secondary to tuberculosis of more remote organs, as the lungs. It usually results in the formation of an ovarian abscess.

The symptoms, methods of diagnosis, and treatment, are the same as those of salpingo-oöphoritis (*v.* page 158).

CHAPTER XII.

DISEASES OF THE PELVIC PERITONEUM AND OF THE UTERINE LIGAMENTS.

Pelvic Peritonitis: Pathological Anatomy, Symptoms, Prognosis, Treatment—Pelvic Cellulitis: Pathological Anatomy, Symptoms, Treatment, Diagnosis, Prognosis—Tumours of the Broad Ligament—Cysts: Pathological Anatomy, Treatment—Fibroma—Hæmatoma—Tumours of the Round Ligament—Cysts—Fibroma.

PELVIC PERITONITIS.

Pelvic peritonitis is the term applied to inflammation of the pelvic peritoneum. It is also known as perimetritis, when it affects the peritoneum covering the uterus and of the broad ligaments.

Ætiology.—Pelvic peritonitis is invariably present to a greater or less extent in salpingo-oöphoritis, as a result of the extension of the tubal infection to the peritoneum. In other cases, the source of infection may be the intestines, or infection may occur as a result of perforating wounds of the uterus or vagina, or, possibly, owing to the extension of infection from any part of the pelvic connective tissue by means of the lymphatics. The last cause opens up the question as to whether infection, travelling through the lymphatics of the broad ligament, sets up peritonitis or not. In all probability it does not set up peritonitis but rather inflammation of the connective tissue, *i.e.* parametritis (Widal).

Pathological Anatomy.—As a consequence of infection, an exudation of lymph is poured out on the surface of the peritoneum, and adhesions form between opposing surfaces in all directions. As a result, the intestines become adherent to one another, to the uterus, and to the appendages; while the uterus and appendages become glued together and to the peritoneum of Douglas' pouch. If the infection is acute, pus may form, and, collecting in the interspaces between the adhesions, may lead to accumulations of very considerable size. Such an abscess may burst either externally, or into the vagina, uterus, bladder, rectum, or intestines. As the inflammation subsides, the adhesions contract and become firmer, and in this way adherent malpositions of the uterus and fixed ovaries are produced.

Symptoms.—The symptoms caused by acute pelvic peritonitis are almost the same as those caused by acute salpingo-oöphoritis. As the chronic stage is reached, the symptoms are due to the displacements, which the contraction of the adhesions causes, of the various organs. Thus, there may be the symptoms of chronic metritis, from the displacement of the uterus; irritability of the bladder, from the traction exerted upon it by contracting bands; flatulence, and a greater or less degree of obstruction to the intestines, from constricting bands, and ovarian tenderness, or pain, from pressure on the ovaries.

ugh ←
Rapid
men
llen
mpanitic
inful
nder
rport)
rs
iting

Prognosis.—The prognosis of pelvic peritonitis in its acute stage is somewhat serious, on account of the risk of the infection extending to the general peritoneal cavity. Even after the acute stage has passed away, a return of it may occur at any time. In the chronic stage, pelvic peritonitis does not as a rule endanger life, except in rare cases by causing intestinal obstruction. The patient, however, seldom completely recovers from an attack, as the adhesions and their effects persist, causing a varying degree of discomfort or pain.

Treatment.—The treatment of pelvic peritonitis in the acute stage consists in keeping the patient at rest in bed, adopting measures to relieve the pain, and promoting the peristalsis of the intestines. The pain may be best relieved by the application of hot stupes over the hypogastrium, or sometimes of an ice-bag, by warm vaginal douches, and by the insertion of ichthyol plugs into the vagina. Leeches, and dry-cupping over the lower portion of the abdomen are also recommended. If accumulations of pus form in Douglas' pouch or amongst the intestines, they must be opened, if possible through the vagina. If the abscess must be opened from above, sufficient time must, if possible, be allowed to permit of the formation of adhesions between its wall and the abdominal walls.

In the chronic stage, relief may be afforded to the symptoms by the same palliative measures as give relief in salpingo-oöphoritis (*v.* page 172). The radical treatment of this stage consists in the following measures:—

Hot do
Schult
curet

(1) The removal of the cause of the peritonitis, as inflamed ovaries or tubes, suppurating tumours, etc.

(2) The breaking down of adhesions, with a view to correcting the malpositions of the uterus which they cause. This proceeding may be carried out by external manipulations by Schultze's method (*v.* page 336), or after opening into the peritoneal cavity either by the vaginal or the abdominal route.

As a rule, it is advisable to commence in chronic pelvic peritonitis with palliative treatment, and to persist in it for some time. If it fails to relieve the pain, then curetting and the breaking down of adhesions by Schultze's method is tried. If the latter procedure is found to be impossible or inefficient, it will be advisable—if the symptoms are severe—to open the abdominal cavity with a view to discovering the exact condition of affairs and to correcting it. If this is done, adhesions can be broken down, diseased appendages removed if necessary, and the uterus fixed anteriorly either by ventro- or vaginal fixation.

PELVIC CELLULITIS.

Pelvic cellulitis is the term applied to inflammation of the pelvic subperitoneal tissue due to infection, either directly, or from an already infected area *viâ* the lymphatics. When it affects the subperitoneal tissue in the neighbourhood of the uterus or broad ligaments, it is sometimes termed parametritis. It most usually occurs as a condition secondary to septic or gonorrhœal endometritis, especially when such a condition starts after parturition. It also occurs from traumatisms, as deep lacerations of the cervix and wounds of the vaginal vault, which by opening into the pelvic tissue, permit the passage of bacteria.

Pathological Anatomy.—Two forms of pelvic cellulitis may 1 occur:—a diffuse form, in which the infection extends rapidly through the entire pelvic connective tissue; and a circumscribed form, in which the infected area remains limited to one portion of the connective tissue. In the former case the infection is usually more virulent, the entire pelvic tissue becomes infiltrated by an exudation of small round-cells and sero-purulent fluid, and as this exudation increases in amount the uterus becomes so fixed that it seems to be embedded in plaster of Paris. In the ii circumscribed form, this exudation is limited to one or other side of, or in front of or behind, the uterus, and, according to its situation, is spoken of as anterior, posterior, or lateral parametritis. In either form, the exudation may follow one of two courses;—it may be absorbed, or suppuration may take place. 1 In those cases in which absorption occurs, a certain degree of infiltration and of cicatricial contraction of the uterine ligaments persists, leading to subsequent displacements of the uterus (*v.* page 96 and Fig. 39). 2 If an abscess forms, it opens most frequently above Poupart's ligament. It may also open through the ischial foramen, at the outer margin of the quadratus lumborum, below Poupart's ligament, or into the vagina, bladder, or rectum (Dührssen).

Symptoms.—The symptoms are very similar to those of the acute stage of pelvic peritonitis. If, as sometimes happens, the sheath of the ileo-psoas muscle is involved, the patient when in bed will lie with the leg on the affected side flexed, in order to relax the muscle as far as possible. If pus forms, the temperature becomes hectic in character, and night sweats and rigors occur. In the chronic stage, the symptoms are due to the displacements which are brought about by the cicatricial contraction of the ligaments.

Diagnosis.—The diagnosis is made from the symptoms, taken in conjunction with the results of a pelvic examination. The uterus is found to be surrounded by a firm immovable mass, or else to be displaced to one or other side by such a mass. If the inflammation is situated in the tissue at the base of the broad ligament, the vagina feels as if it were roofed over by the exudation. If the inflammation is principally in the layers of the broad ligament, a hard mass can be felt by abdominal palpation, situated to one or other side of the uterus. A unilateral cellulitis, especially if situated in the layers of the broad ligament, is very likely to be mistaken for a suppurating hæmatoma so far as the physical signs are concerned. The diagnosis is made from the history.

Prognosis.—A diffuse cellulitis may kill the patient by setting up a general septic poisoning—such a termination is, however, rare, or, if an abscess forms, by bursting into the peritoneal cavity. Sometimes, the exudation may be absorbed, and leave no very palpable trace of its existence behind. More generally, however, there will be some displacement of the uterus caused by cicatricial contraction of the ligaments.

Treatment.—The treatment of pelvic cellulitis resembles the treatment of the other acute inflammations of the pelvis—rest in bed, hot stupes, hot vaginal douches, the use of opiates if necessary, and the administration of easily digested and nourishing food, stimulants, and laxatives. If an abscess forms, it will tend to point in one of the places already mentioned. If possible, that is if the abscess is situated in the base of the broad ligament, or beneath the peritoneum of Douglas' pouch, it must be opened from the vagina. If it is bulging upwards into the abdomen, and tending to point above, its sac must be allowed to become adherent to the abdominal walls before opening it. After the contents have escaped, it is advisable to make a counter-opening into Douglas' pouch from the vagina in order to allow free drainage (*v.* page 395).

TUMOURS OF THE BROAD LIGAMENT.

CYSTS.—Cysts of the broad ligament arise in the parovarium (*παρά*, beside; *ovarium*, an egg-keeper) or Organ of Rosenmuller, that is the remains of the Wolffian body. The parovarium consists of three sets of tubules;—an outer set, about three in number, running vertically to the outer extremity of the broad ligament and sometimes ending in small pedunculated cysts (the
hydatids of Morgagni)—these are known as Kobelt's tubes; an 1,
inner set of about twelve in number, also running vertically and 2,
radiating from the par-oöphoron; and, lastly, a larger tube 3
running from Kobelt's tubes horizontally across the top of the Gärtner
second set, and ending sometimes blindly in the broad ligament, duct
at other times in the vaginal wall. The last is known as

Gärtner's duct, and is the representative of the vas deferens in the male (*v.* Figs. 13 and 79).

Pathological Anatomy.—The small pedunculated cysts developing in Kobelt's tubes are of no clinical importance. The sessile cysts which grow between the layers of the broad ligament are usually comparatively thin-walled structures, covered by peritoneum, lined with columnar epithelium—if it has not disappeared as the result of pressure atrophy, and almost always unilocular (*v.* Fig. 89). In a few instances, they become papillomatous, and in these cases they are believed to arise in Gärtner's duct (Bland-Sutton). A papillomatous cyst of the ovary arising in the par-oöphoron would also tend to burrow between the layers of the broad ligament, so that it must be remembered that papillomatous intra-ligamentous cysts may arise in this manner, and not from the parovarium. Parovarian cysts, which are not papillomatous, can be distinguished from ovarian cysts in the following manner:—

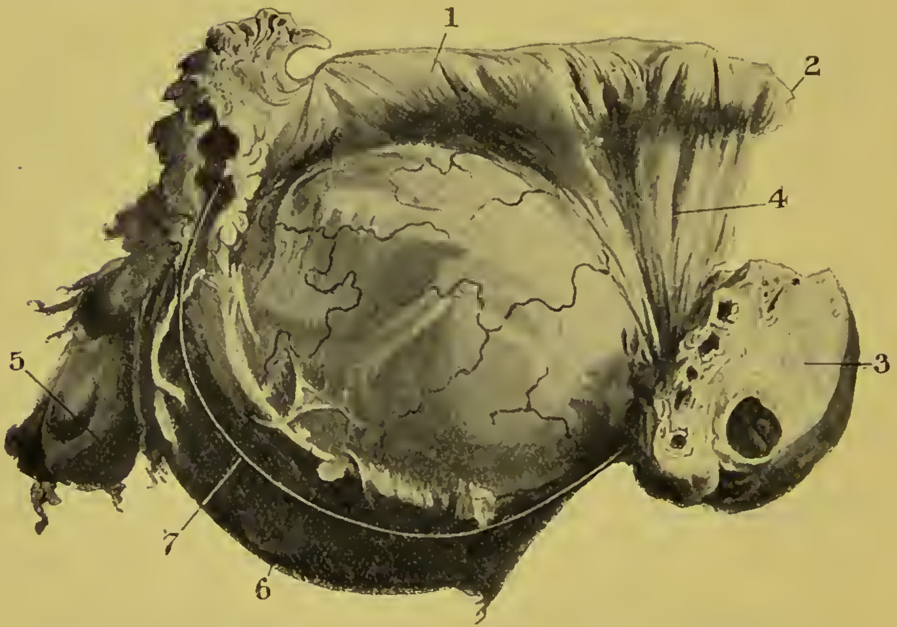


FIG. 89.—A cyst of the broad ligament (parovarian). 1. Fallopian tube (note the folds of the broad ligament passing from it to form the capsule of the cyst). 2. Uterine end of tube. 3. Ovary. 4. Folds of broad ligament. 5. Two small accessory cysts of the fimbriæ. 6. Ovarian fimbria passing from the tube to the ovary; a bristle (7) is passed along it. (*Roberts.*)

(1) They are completely covered by peritoneum which can be easily stripped off.

(2) They are almost always unilocular, and very thin walled.

(3) The contents are clear and slightly alkaline, and contain a substance which is precipitated by the addition of alcohol.

(4) The Fallopian tube is stretched over the cyst in intimate connection with it.

Cysts developing in the terminal portion of Gärtner's duct burrow deeply into the pelvic cavity, and may even bulge into the vagina (*v.* page 51 and Fig. 13).

Symptoms and Treatment.—The symptoms and diagnosis of these cases are practically the same as those of ovarian cysts. The treatment is also the same; as, although small parovarian cysts are not of any great consequence, it is not possible to make a differential diagnosis between them and ovarian cysts prior to their removal. Gärtnerian cysts, which burrow deeply, may in some cases be most easily removed through the vagina.

FIBRO-MYOMA.—Fibro-myomata of the broad ligament, quite distinct from fibro-myomata of the uterus, are occasionally met with. They have been supposed by some (Virchow, Kiwisch) to start in the uterus and then to become detached; but it is more generally considered that they arise, independently of the uterus, in the muscle-fibres which are prolonged into the base of the broad ligament. They manifest their presence by the pressure symptoms to which they give rise. Their removal is sometimes extremely difficult, on account of their close relationship with the blood-vessels and the ureter.

HÆMATOMA.—Hæmatoma of the broad ligament will be discussed under the head of Internal Hæmorrhage (*v.* page 220).

TUMOURS OF THE ROUND LIGAMENT.

CYSTS.—Cysts of the round ligament, under the form of accumulations of serous fluid beneath the peritoneal covering which accompanies the round ligament into the inguinal canal, have been already described under the name of hydrocele of the canal of Nuck (*v.* page 40).

FIBROMA.—Fibromata and fibro-myomata of the round ligament also occur. They may reach the size of a fœtal head or a little larger, and grow either upwards into the abdominal cavity or externally, according as they are situated above or below the internal abdominal ring.

Those that grow into the abdominal cavity have to be distinguished from ovarian tumours, and pedunculated uterine myomata. These tumours should be removed if they reach any considerable size, on account of the danger of their undergoing sarcomatous degeneration. If external, they can be easily enucleated; if internal, they must be removed by an abdominal cœliotomy.

CHAPTER XIII.

TRAUMATIC DISEASES OF THE GENITAL ORGANS.

Traumata which favour Prolapse—Symptoms—Diagnosis—Treatment. Traumata which cause Fistulæ—Varieties—Ætiology, Symptoms—Diagnosis—Treatment.

Traumatisms of the genital tract, occurring during parturition, are extremely common accidents. If they are classified according to the situations in which they occur, the important forms fall under the following heads:—

(1) Traumatisms of the perinæum.
(2) Traumatisms of the recto-vaginal septum.
(3) Traumatisms of the vesico-vaginal septum.
(4) Traumatisms of the cervix.

If, however, we endeavour to group *cases* according to this classification, we shall find that many of them would fall under two or even three of these heads, and that consequently the foregoing is not a very practical arrangement from the point of view of treatment. A better arrangement is to classify these traumatisms according to the consequences they cause. If this is done, it will be found that they can be divided into:—

I. Traumatisms which tend to produce or to favour prolapse of the vaginal walls or uterus.
II. Traumatisms which tend to produce fistulous communications between the genital tract and the neighbouring organs.

I. Traumatisms which tend to produce or to favour Prolapse of the Vaginal Walls or Uterus.—Traumatisms which tend to produce or to favour prolapse of the vaginal walls or uterus include lacerations of the perinæum, recto-vaginal septum, and cervix. The first two are the most important; the last only tends to favour the occurrence of uterine prolapse by setting up metritis, and so increasing the size of the uterus.

Slight lacerations of the perinæum are of little or no importance, save at the time of their occurrence. Lacerations, however, of either the vaginal wall or perinæum which involve the levator ani muscle are of the greatest importance, owing to the further pathological conditions which they tend to bring about.

When the levator ani muscle is lacerated to such an extent as to leave a gap between its fibres, we have the first stage in the causation of uterine descent. The anterior wall of the rectum becomes forced into this gap during any straining efforts, causing the formation of a *cul-de-sac* in the bowel in front of the anal canal, and a protrusion of the posterior vaginal wall through 1. the relaxed vulvar opening—a rectocele (*rectum*, the rectum; κήλη, a tumour). When the patient endeavours to defæcate, the contractions of the rectum, instead of driving the fæces into the anal canal, drive them into this *cul-de-sac*. The result is considerable difficulty in emptying the bowel, necessitating increased straining, and a further increase in the size of the rectal *cul-de-sac*, and so a vicious circle is established. The next stage consists in a similar prolapse of the anterior vaginal wall and bladder, due to the loss of support which they experience as a result of the laceration and prolapse of the posterior vaginal wall, and also to the increased intra-abdominal 2. pressure during defæcation—a cystocele (κύστις, the bladder; κήλη). As a consequence of this prolapse of both vaginal walls, there is a considerable amount of traction exerted upon 3 the uterus in the region of the cervico-vaginal junction. The result of this traction is that the posterior ligaments of the uterus are lengthened, and the supra-vaginal portion of the cervix elongates. If, in association with this condition of the vagina, the uterus becomes retroverted owing to the relaxation of the posterior ligaments and the downward drag of the vagina, and so comes to lie with its axis more or less coinciding with the axis of the vagina, any increase in the intra-abdominal pressure will tend to drive it downwards into the vagina (*v.* Fig. 90).

In other cases, the anterior vaginal wall prolapses first, as a result of lack of support from the posterior vaginal wall due to perinæal rupture. The uterus may then be the next part to prolapse, and last of all the posterior vaginal wall appears outside the vulva.

Symptoms.—The symptoms, which lacerations cause, depend upon their situation, their degree, and upon the amount of inflammation which accompanies them.

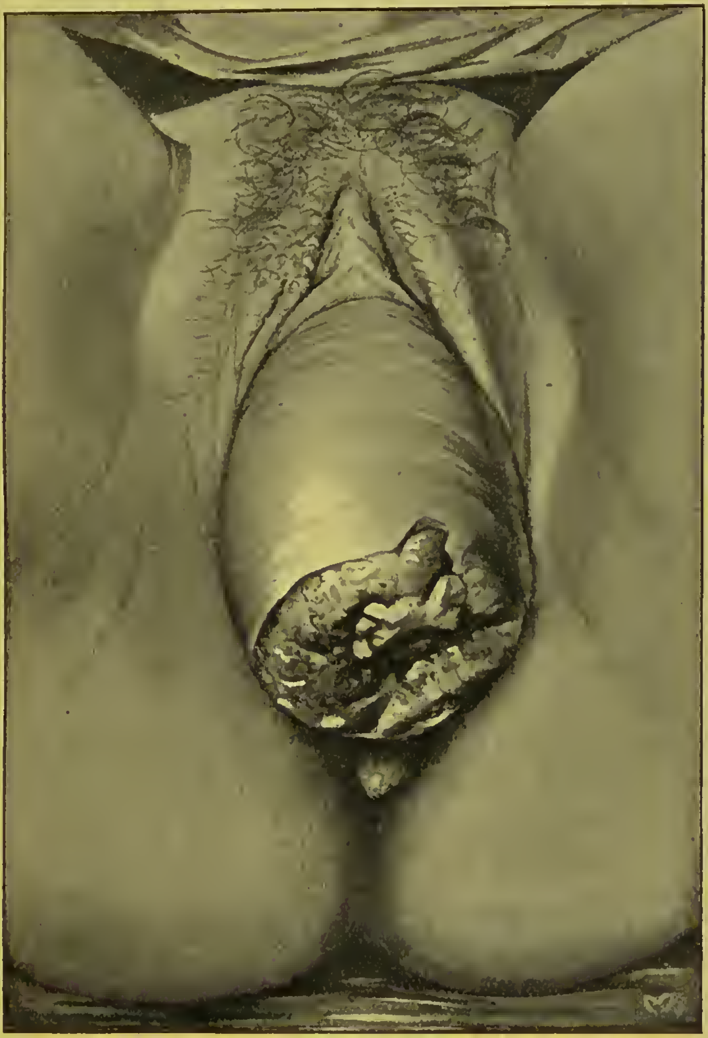


FIG. 90.—Complete prolapse of the uterus and inversion of the vagina. Note the true ulceration of the cervix, the result of friction against the skin of the thighs. (From a photograph by Dr. Arthur Ball.)

Perinæal Lacerations.—Perinæal lacerations, if complete, that is if through the sphincter ani and rectal wall, cause incontinence of fæces. If incomplete, they tend to cause a gaping of the vagina, a condition which favours the occurrence of vaginitis and the various symptoms by which that complaint is accompanied. If the levator ani muscle is torn and there is a prolapse of the vaginal walls, there will also be vaginitis, and probably difficulty in defæcation and micturition. If the uterus descends, there will be in addition the various symptoms of prolapse or procidentia (*v.* page 71).

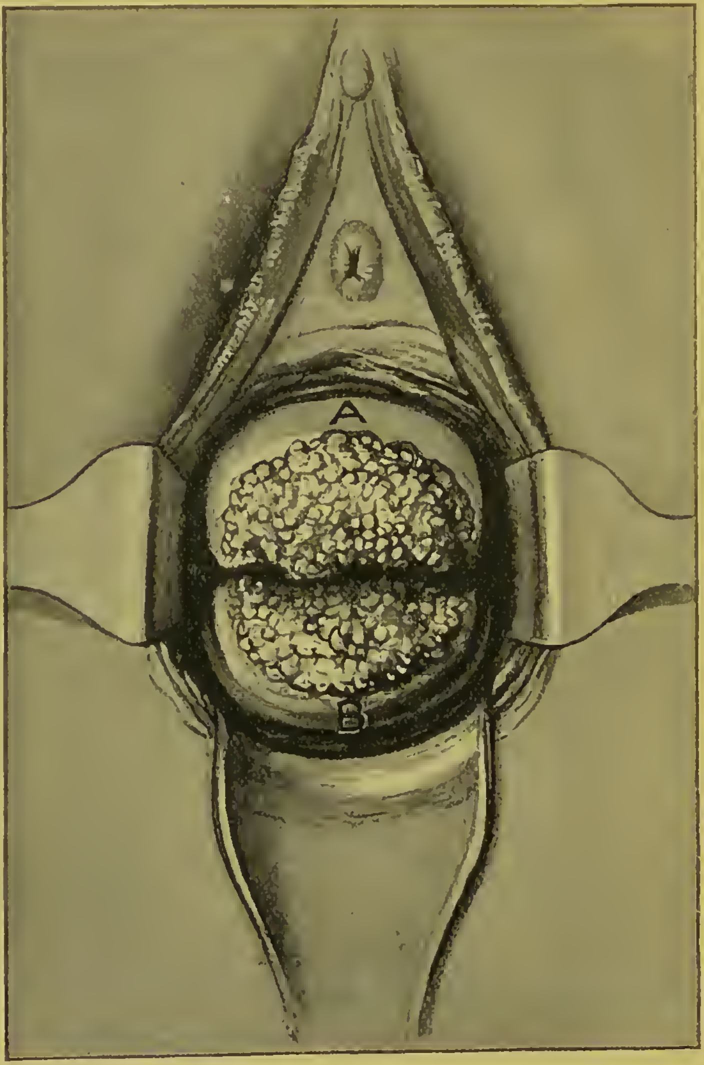


Fig. 91.—Extensive ectropion of the cervix, the result of bi-lateral laceration. If the points A and B on the anterior and posterior lip respectively were brought together, the ectropion would disappear.

Cervical Lacerations.—Cervical lacerations cause the condition known as *ectropion*, *i. e.* an eversion of the lining mucous membrane of the cervical canal, a state which is liable to be confounded with the so-called *erosion* (*v.* page 120 and Figs. 51 and 91). An *ectropion* tends to cause endocervicitis, and this in turn tends to set up endometritis with its train of symptoms (*v.* page 114).

Diagnosis.—The diagnosis of these cases can be made by inspection. A vaginal cyst may sometimes simulate a cystocele. A myoma growing from the cervix may possibly be mistaken for a prolapsed uterus. The condition of the levator ani muscle can be determined by holding apart the patient's knees while she endeavours to approximate them. If the muscle is intact, it will be felt to contract by the finger in the vagina. If it is not intact, the gap between its torn edges will be made more apparent.

Treatment.—Perinæal lacerations should always be sutured at the time at which they occur. If this was regularly and carefully done, there would not be the same number of cases of prolapse of the uterus as are found at present. Perinæal lacerations cannot always be prevented; they can, however, in almost all cases, be remedied by suturing them immediately after their occurrence, and the obstetrician who neglects to do so does not consult the interests of his patient.

For chronic complete lacerations of the perinæum, either Hegar's or Lawson Tait's operation is best. For those cases of incomplete laceration in which there is a deficiency of tissue Lawson Tait's operation is best (*v.* page 283). While for those cases in which there is a great redundancy of tissue, Hegar's colpo-perinæorrhaphy, or the modification of it which will be described, is perhaps more suitable (*v.* page 295).

In some cases of cystocele, an anterior colporrhaphy is required, while in other cases some form of pessary (*v.* Fig. 25) may be sufficient.

In lacerations of the cervix, our treatment may be palliative or radical. Palliative treatment is directed to the cure of the endocervicitis which frequently accompanies lacerations, and also to the destruction of the cervical glands whose mouths have been everted into the vagina as a result of the tear. It is carried out by curetting the endometrium and endocervix, and also by swabbing out the latter with strong caustics, as nitrate of silver, carbolic acid, or nitric acid. The application of caustics is made once or twice in the week, and the treatment must as a rule be persisted in for several months. Owing to the length of time which is required in order to effect a cure by these means, radical treatment is to be preferred in cases of deep laceration accompanied by much inflammation and glandular hyperplasia. It consists either in the amputation of the diseased portion of the cervix, or in suture of the tear. Amputation is usually carried out by Simon-Marckwald's or by Schrœder's method (*v.* page 311), and is to be preferred in those cases in which in addition to the laceration there is much cervical hypertrophy. Suture of the tear can be best performed by Emmet's method in the case of deep bilateral lacerations, and by Sänger's method in the case of smaller lacerations especially when they are unilateral (*v.* page 314).

II. TRAUMATISMS WHICH TEND TO PRODUCE FISTULOUS COMMUNICATIONS BETWEEN THE GENITAL TRACT AND OTHER ORGANS.—Fistulæ between the genital tract and neighbouring organs have become much less common than they formerly were. This result can be almost entirely attributed to the great advances which have been made in obstetrics, as it is during parturition that such conditions usually start.

Varieties.—The following varieties of fistulæ may occur :—

(1) Urethro-
(2) Vesico-cervico-
i, (3) Vesico-
(4) Uretero-
ii (5) Recto-
(6) Entero-
} vaginal.

(7) Vesico-
(8) Uretero-
(9) Recto-
} uterine.

Of these various forms, much the most common is a vesico-vaginal fistula occurring as the result of sloughing after labour. Recto-vaginal fistulæ are perhaps the next most common, but they are much rarer than vesico-vaginal. Recto-uterine fistulæ are probably always the result of malignant disease. Vesico-uterine fistulæ are said to be always vesico-cervical as the body of the uterus is not in direct contact with the bladder. This is probably true in the case of those fistulæ which are the result of sloughing from long-continued pressure; but in the case of ulceration, due to malignant disease, it must be quite possible to have a fistula between the bladder and the body of the uterus.

Symptoms.—Vesical and ureteral fistulæ give rise to incontinence of urine, the urine escaping directly into the vagina in the case of vaginal fistulæ, or through the os externum in the case of uterine fistulæ. Urethral fistulæ give rise to the escape of urine into the vagina during micturition. Rectal and intestinal fistulæ give rise to incontinence of fæces and gas.

Ætiology.—Fistulæ may arise as the result of one or other of the following causes:—

(1) Ulceration.—Ulceration, of such a nature as to cause a fistula, is most usually brought about by the prolonged presence of the fœtal head at the pelvic brim, or in the pelvis, during parturition. It may also be caused by malignant disease, tuberculosis, the long-continued pressure of foreign bodies—as pessaries—in the vagina, phlegmonous vaginitis (*v.* page 47), or syphilis.

(2) Surgical interference.—A fistula may be produced accidentally in the course of a surgical operation, or it may be formed deliberately as in the treatment of cystitis (*v.* page 28).

(3) Congenital malformations.—Fistulæ due to this cause more properly come under the head of "deformities." They are not, however, of very great importance; and, as their treatment,—whenever possible, is the same as that of other forms of fistulæ, they may be mentioned here. They are found in three situations:—as a urethro-vaginal fistula, the result of hypospadias; as a uretero-vaginal fistula; and as a recto-vaginal fistula.

Diagnosis.—The diagnosis of the existence of a vesical fistula is as a rule easily made. The only condition which can simulate such a fistula is incontinence of urine due to relaxation of the sphincter from some cause or other, but, in this condition, urine can be seen escaping from the orifice of the urethra. It is, however, sometimes extremely difficult to determine the exact situation of the fistula. This as a rule can best be done by injecting the bladder with some coloured solution, such as permanganate of potash or weak creolin, and then, if the opening is of sufficient size, the fluid will be seen escaping through it. Where the opening is so small that none of the injecting fluid can be forced through, Pozzi recommends that a piece of blotting-paper be applied to the vaginal wall after first drying the latter thoroughly. The moist absorption area on the paper will show the situation of the opening. If the fistula opens into the cervix, the latter must be dilated as far as possible, and then the opening may be found by means of a stylette. Ureteral fistulæ are more difficult to diagnose. In their case, the coloured injection which is thrown into the bladder does not escape through the fistula; the urine which escapes comes intermittently as little gushes; if the bladder is cystoscoped, the flow from one ureter is seen to be either wholly or partially stopped; if the ureters are catheterised, an obstruction to the passage of the catheter will be found in one or other; and, lastly, if the obstructed ureter is injected through the catheter with a coloured solution, the solution will be seen to escape through the fistula.

Rectal fistulæ are usually of much larger size than are vesical fistulæ, and, consequently, are easy to diagnose.

Treatment.—In all cases of fistulæ, an attempt must be made to cure the condition, except in those cases of malignant origin which are obviously hopeless. In recto- and vesico-vaginal fistulæ of small or moderate size, such treatment is usually successful, and even in the case of cervical and uterine fistulæ cures have been obtained by modern methods. The most difficult of all cases are those in which the ureter opens into the vagina.

Urethral fistulæ may, if they are very small, be cured by the application of caustic, or by revivification and suture of the edges; if they are large, their cure is very troublesome and sometimes necessitates the reconstruction of practically the entire urethra. This proceeding is carried out by means of flaps taken from the labia minora (Fritsch), from the recto-vaginal septum (Freund), from the vagina (Lawson Tait, Emmet), or from both the vulva and vagina (Péan). In cases of very extensive loss of tissue, the vagina has been obliterated, in such a manner as to leave an anterior canal, which will take the place of the urethra, or to leave a recto-vaginal fistula by means of which the bladder can empty itself into the rectum.

Vesico-vaginal fistulæ are the most amenable to treatment of all urinary fistulæ. In cases due to sloughing after labour, the best time at which to operate is from six to eight weeks after that event (Kelly). If the vaginal walls are in a condition of much inflammation and covered with urinary salts, sloughs, etc., they must be treated by frequent douches, glycerine and ichthyol plugs, and mild caustics, so as to bring them into as healthy a condition as possible. In all cases any cicatrices, which prevent the walls of the fistula being drawn together, must be divided. In cases of small or medium-sized fistulæ, the ordinary operation of vivifying the edges of the opening is sufficient (Marion Sims) (*v.* page 264). A modification of this operation has been described by Rutherford Morison, which appeared well suited for cases in which there is no extensive sloughing of the vaginal walls (*v.* page 266). If the vesico-vaginal septum is very thin—a condition which of course tends to make it more difficult to obtain a firm hold for the sutures—a flap-splitting operation may be resorted to, which enables a wider area of union to be obtained (*v.* page 265). In very large fistulæ, Mackenrodt's operation of separating the bladder from the vaginal wall is probably the most suitable; as, by so doing, the bladder is freed from the rigid scar tissue which prevents its edges being brought into apposition with one another (*v.* page 269). In the very rare cases in which plastic operations fail, the only thing that can be done is to close the vagina—colpocleisis.

In vesico-cervical or vesico-cervico-vaginal fistulæ, there is usually a considerable amount of deformity of the parts due to sloughing and to the formation of scar tissue; and it is this which causes the great difficulty in obtaining a satisfactory result in these cases. If the fistula is very small, it may be cured by the application of caustic; if this fails, one of the following methods may be adopted. Operating from the vagina, the bladder may be detached from the cervix, and the edges of the opening revivified and then sutured (*v.* page 274). Abdominal cœliotomy may be performed, the peritoneum at the bottom of the vesical pouch incised, the bladder separated from the uterus, and the fistula thus reached and sutured (*v.* page 274). An incision is made just above the pubes in the middle line, the bladder opened anteriorly, the fistula on the posterior wall brought into view, revivified, sutured, and the wound in the anterior bladder wall and abdominal wall closed (Trendelenburg) (*v.* page 271). If the fistula cannot be closed, it may be considered advisable to obliterate the cervical orifice—hysterocleisis.

In the case of ureteral fistulæ, it is often very difficult to obtain a complete cure. The following are the various procedures which have been recommended :—

(1) Revivification and suture of the fistula. This is suited for cases of vesico-uretero-vaginal fistula, and for some cases of uretero-vaginal fistula after they have been artificially converted into the preceding condition.

(2) Implantation of the ureter into the bladder. This can sometimes be done in cases in which the preceding operation fails, and may be performed either by the abdominal or vaginal route. The latter is of course the more preferable, if it is possible. Uretero-uterine fistulæ must be treated by implantation, usually performed by the abdominal route.

(3) If neither of the above lines of treatment succeeds in closing the fistula, two courses remain open with a view to checking the urinary incontinence. The first of these consists in closing the vagina (colpocleisis), after making a large vesico-vaginal fistula in order to ensure the constant change of the urine which collects in the vagina. The second course consists in extirpating the kidney of the same side as the fistula. There are obvious objections to either of these courses, and accordingly they must be strictly limited to cases which resist all less radical treatment.

Recto-vaginal fistulæ can as a rule be easily cured by means of a flap-splitting operation or by simple revivification of the edges, except in those cases which are the result of malignant disease. In those cases in which the fistula is situated in the lower third of the vagina and where the perinæum has also been torn, an excellent proceeding consists in splitting the perinæal body as in Lawson Tait's flap-splitting operation, carrying such splitting well above the fistula, then suturing separately the opening in the vaginal and rectal wall after first revivifying their edges, and lastly suturing up the perinæum in the ordinary manner. In recto-uterine or recto-vaginal fistulæ of malignant origin, some relief may be afforded by hysterocleisis or colpocleisis.

Entero-vaginal fistulæ, if small, may be cured by the application of the cautery or of nitric acid. If this fails, revivification may succeed. Cases, which resist these comparatively mild measures, may be cured in one of the following ways :—by separating the intestine from the vaginal wall, either through the vagina or by the abdomen, and directly suturing the opening in it ; by performing entero-enterostomy, or, if the fistula is low down in the small intestine, entero-rectostomy ; or, by first making a large recto-vaginal fistula and then performing colpocleisis, by this means turning the vagina into a kind of rectal diverticulum. It is unnecessary to dwell on the fact that the last course should only be resorted to when all other means have failed.

CHAPTER XIV.

GENITAL ATRESIÆ.

Genital Atresiæ: Varieties—Symptoms—Diagnosis—Prognosis—Treatment.

ATRESIA (ἀ, negative; *τετραίνω*, I perforate) of any part of the utero-vaginal canal may occur as the result of a failure of development and so be congenital; or it may occur as an acquired condition,—as the result of sloughing, from the too free use of caustics, from malignant disease, or from a badly performed amputation of the cervix or a trachelorrhaphy. Congenital atresiæ are the more frequent. Whether the condition is congenital or acquired, the symptoms and consequences to which it gives rise are similar.

Varieties.—The following are the principal forms which are met with:—

(1) Atresia at the level of the hymen—imperforate hymen.
(2) Atresia of the lower or middle portion of the vagina.
(3) Atresia of the cervix:—(*a*) at the os externum; (*b*) at the os internum.
(4) Atresia of any portion of the vagina of one side of a double vagina and uterus.
(5) Atresia of any portion of the cervix of one side of a double or bicornuate uterus.

Symptoms.—Atresia of any portion of the utero-vaginal canal does not, as a rule, cause sufficient symptoms to lead to its discovery until the onset of puberty. Then, at each succeeding menstrual period, the symptoms become more marked. At first, they consist in the occurrence of slight pains, general discomfort, and the usual subjective symptoms of approaching menstruation without any appearance of the flow — apparent amenorrhœa. These symptoms return every month, and after a time the patient's abdomen increases progressively in size.

Each month, the pain, at what ought to have been the menstrual period, becomes worse; and finally it persists from one period to the next. At the same time, the lower part of the abdomen is found to be occupied by a tumour which rises out of the pelvis. If the atresia is situated at the hymen, this tumour will consist of the vagina enormously distended with blood—*hæmatocolpos* (Fig. 92, A), and also, in some cases, of the distended uterus—*hæmatometra* (Fig. 92, C and D), and tubes—*hæmatosalpinx* (*v.* Fig. 92, D). If the atresia is situated in the vagina or at the cervix, similar distension of the cavities above the obstruction will occur (Fig. 92, E, F, and Fig. 93, G, H.)

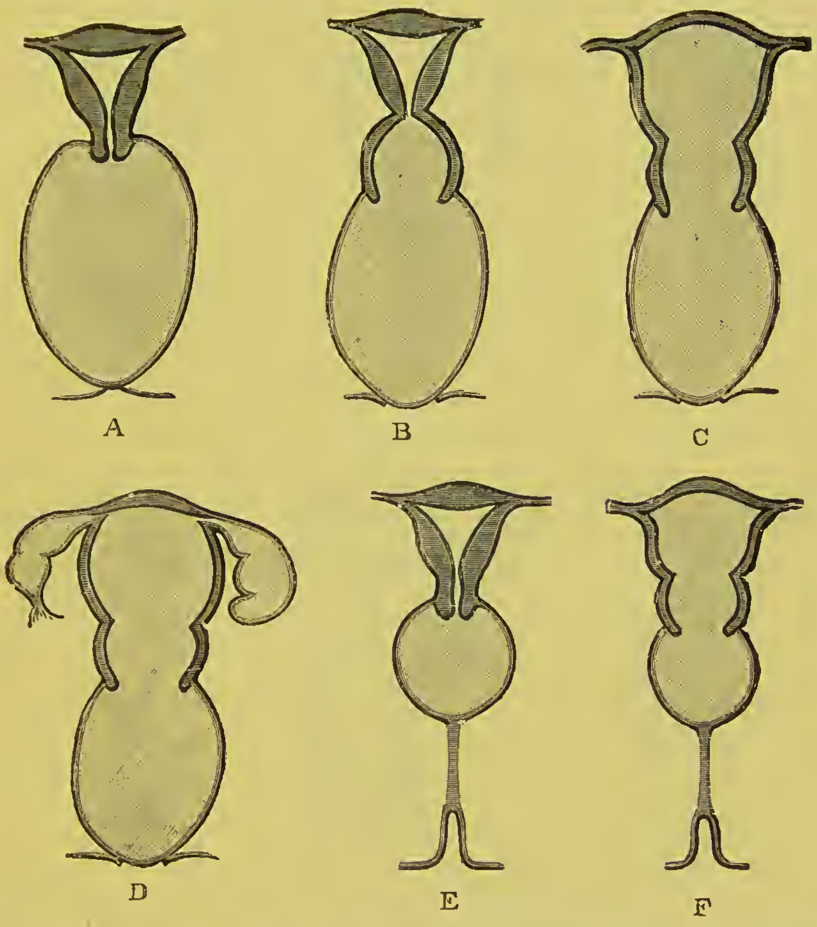


FIG. 92.—Diagram illustrating the effects of atresia of the genital passages. A. Hæmatocolpos. B. Hæmatocolpos and hæmatocervix. C. Hæmatocolpos and hæmatometra. D. Hæmatocolpos, hæmatometra, and hæmatosalpinx. The foregoing are due to atresia of the hymen. E. Partial hæmatocolpos. F. Partial hæmatocolpos and hæmatometra; both due to atresia of the lower half of the vagina. (*Sutton and Giles.*)

Diagnosis.—On inspection of the parts, the condition is at once recognised in cases of imperforate hymen. The diagnosis is a little more difficult when the atresia is situated in the vagina, or at the cervix. It is especially difficult in cases of double uterus or double uterus and vagina in which the obstruction is one-sided (Fig. 93, I, J, K, L), as some menstrual flow appears, coming from the unobstructed side. In these cases, a rectal examination will usually enable the nature of the case to be recognised.

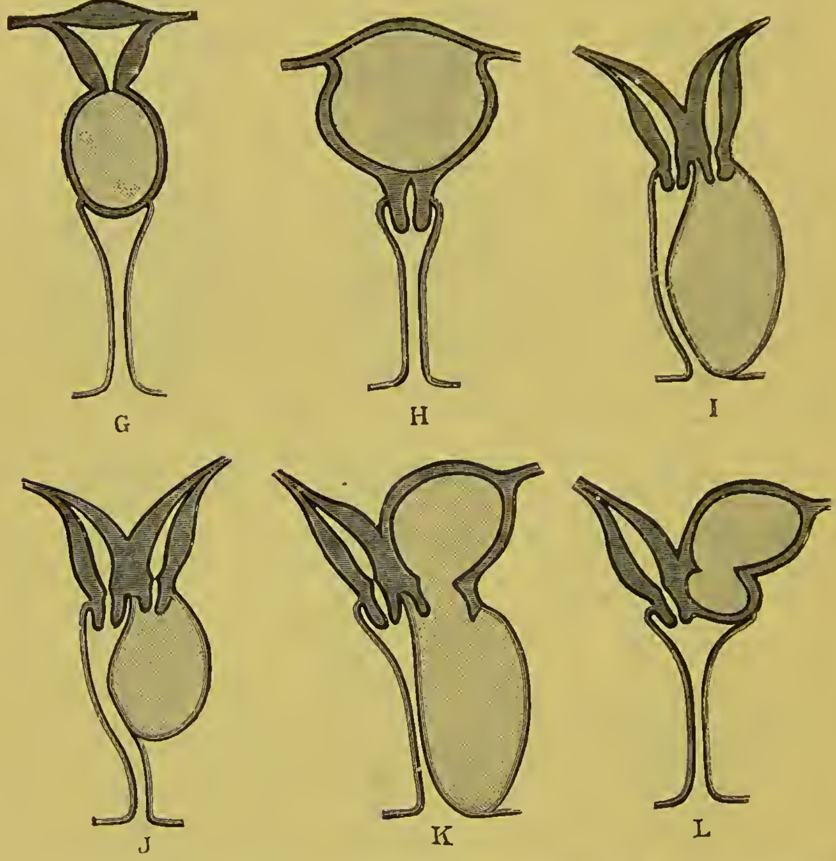


FIG. 93.—Diagram illustrating the effects of atresia of the genital passages. G. Hæmatocervix, due to atresia of os externum. H. Hæmatometra, due to atresia of os internum. I. Hæmatocolpos in one side of a double vagina, due to atresia of hymen of the same side. J. Partial hæmatocolpos in one side of a double vagina, due to atresia of lower portion of vagina of the same side. K. Hæmatocolpos and hæmatometra in one side of a double vagina and uterus, due to atresia of the hymen. L. Hæmatometra in one side of a double uterus, due to atresia of os externum. (*Sutton and Giles.*)

Prognosis.—These cases are more serious than might at first be thought. Their danger arises from the ease with which the retained blood becomes septic or putrid after air gains access to it. Another danger arises from the fact that, in cases of great distension in which the tubes are also involved, adhesions may form between the latter and the intestines, and, as the accumulation drains away and the uterus collapses into its normal position in the pelvis, these adhesions are pulled upon and may be torn, thus permitting the escape of the retained and possibly toxic blood into the peritoneal cavity.

The farther up the genital tract the accumulation of blood has extended, the greater the amount of dilatation present; and the older the retention, the more serious is the prognosis.

Treatment.—In cases in which there is a considerable quantity of accumulated blood, care must be taken to ensure its very gradual escape, and also to ensure perfect asepsis, not only during the operation itself, but during the entire time the contents are escaping. A small incision is made through the hymen just large enough to allow the fluid to escape, and the latter is allowed to drain into antiseptic cotton-wool, which is frequently changed. As soon as the greater amount of the fluid has drained away, the incision is enlarged and the cavity well douched out. If the uterus is involved, it should be plugged with iodoform gauze.

When the atresia is situated in the vagina, an operation akin to Amussat's operation for artificial vagina, is perhaps the most suitable procedure (*v.* page 307).

When the cervix is the seat of the atresia, it is sometimes difficult to make an opening into the uterus. The cervix is punctured by means of a trocar at the spot where the cervical canal should have been, and the puncture is enlarged by means of a scissors or bistoury. The contents are then washed out, and the uterus plugged with gauze.

When there is a hæmatosalpinx as well as a hæmatometra, the tubes in some cases evacuate themselves as soon as the uterus is emptied. In other cases, the termination is not so fortunate, and they remain dilated. Usually, in the latter case, the dilated tubes must be removed, but sometimes it may be possible to save one or other of them by opening the fimbriated extremity, washing out the contents, and suturing the opened end to the ovary in such a manner as to include a portion of the latter (*v.* page 384).

CHAPTER XV.

INTERNAL HÆMORRHAGE OF GENITAL ORIGIN.

Intra-peritoneal Hæmorrhage—Ætiology—Symptoms—Diagnosis—Prognosis—Treatment. Extra-peritoneal Hæmorrhage — Symptoms — Diagnosis — Treatment.

The comparative frequency of internal hæmorrhage in women renders it necessary to say a few words about this condition, when it occurs as the result of some morbid state of the pelvic organs.

Internal hæmorrhage may occur as :—

I. Intra-peritoneal hæmorrhage.
II. Extra-peritoneal hæmorrhage.

I. Intra-peritoneal Hæmorrhage.—Intra-peritoneal hæmorrhage is the term applied to hæmorrhage taking place into the peritoneal cavity. When such hæmorrhage occurs, the blood is either diffused freely about the peritoneal cavity, or is encysted owing to the formation of limiting adhesions. In the former case, the resultant condition is known as diffuse intra-peritoneal hæmorrhage; in the latter, as a hæmatocele (*αἷμα*, blood; *κήλη*, a tumour).

Ætiology.—Intra-peritoneal hæmorrhage of genital origin can arise in the following ways :—

(1) Rupture of the sac of an extra-uterine pregnancy, or the occurrence of tubal abortion.
(2) Rupture of the uterus during pregnancy or parturition.
(3) Perforation of the uterus during an intra-uterine operation, as curetting.
(4) Slipping of a ligature from a vessel after any intra-peritoneal operation.

(5) Ulceration of an intra-peritoneal malignant growth, resulting in the opening of a vessel.

(6) Rupture of an ovarian cyst from a traumatism or otherwise.

The only form of hæmorrhage with which we are here concerned is that due to the rupture of an extra-uterine pregnancy, or to the occurrence of a tubal abortion, that is the expulsion of an ovum from the tube through the abdominal ostium into the peritoneal cavity.

It is of importance to recognise why in one case diffuse hæmorrhage occurs, and in another the hæmorrhage is encysted, as in the former case the amount of blood lost, and hence the danger to the patient's life, is very much greater than in the case of the formation of a hæmatocele. All blood poured out into the peritoneal cavity tends to encyst itself, both owing to the clotting of the blood which has been poured out first, and to the irritation of the peritoneum by the effused blood,—an irritation which causes a transudation of lymph and a consequent formation of adhesions. Clotting, sufficient to cause a limitation of the blood, is favoured by the gradual occurrence of the hæmorrhage. On the other hand, where the bleeding is very free there is not time for a sufficiently firm barrier to be formed by the occurrence of clotting to prevent the further escape of blood. Accordingly, there will be a greater tendency to diffuse hæmorrhage when the gestation sac is suddenly ruptured, than when a slow process of tubal abortion occurs. Again, the limitation of the blood by means of adhesions is most likely to occur in those cases in which the peritoneum is in an unhealthy and easily irritated condition, or where adhesions have already formed. That is to say, *ceteris paribus*, diffuse hæmorrhage is more likely to occur when the peritoneal cavity is healthy, encysted hæmorrhage when pelvic peritonitis is present. The effect, which the nature of the case, *i. e.* rupture or abortion, and the condition of the peritoneum, have upon the amount of hæmorrhage, is well expressed in the following sentence:—"The chances of a maximum amount of hæmorrhage are realised in cases of rupture occurring into a healthy peritoneum; of a minimum amount, in cases of abortion when the peritoneal cavity is divided into loculi by adhesions." (Labadie-Lagrave).

Symptoms.—The symptoms of internal hæmorrhage depend upon the amount of blood lost, and on the rapidity with which it is lost. In serious cases, they consist of the ordinary symptoms of hæmorrhage;—collapse, rapid pulse, falling temperature, cardiac failure, cold sweats, rapid and sighing respirations, extreme pallor, and coldness of the extremities. To these symptoms are added others due to the presence of blood in the peritoneal cavity:—extreme pain of so severe a character that it is often difficult to tell whether the collapse of the patient may not be due to it alone,—if the hæmorrhage is occurring very gradually, this pain is not so well marked; tenderness and distension of the abdomen; and vomiting.

The foregoing are the immediate symptoms at the time of rupture; if the patient survives and the blood becomes encysted, other symptoms appear after a short time. Encysted hæmorrhage is always found in Douglas' pouch, owing to the situation of the rupture and to the fact that the pouch is the most dependent part of the peritoneal cavity. Consequently, if the hæmatocele is of large size, the symptoms will be those of intra-pelvic pressure, such as occur in the case of an impacted ovarian cyst:—pain from pressure on the pelvic nerves; almost complete constipation, owing to the coagulation of the ring of blood which surrounds the rectum; and interference with the passage, or perhaps complete retention, of urine, owing to the displacement forwards of the uterus so as to press upon the base of the bladder.

Finally, during, and as a result of the process of absorption of the hæmatocele—a process which takes from one to ten months according to the amount of blood which escaped originally, the patient suffers from a certain amount of auto-intoxication, as shown by her somewhat jaundiced aspect, her great debility, and the tendency she has to slight fluctuations of temperature. In some cases, the process of absorption does not go on aseptically. Bacteria make their way from the rectum into the hæmatocele, and putrefaction or suppuration of the clotted blood takes place. An abscess thus formed may burst into the rectum or vagina, or, more rarely, into the bladder or intestine, or through the abdominal wall.

Diagnosis.—The diagnosis of diffuse hæmorrhage must be made from the symptoms, as there are no characteristic physical signs. The collapse of hæmorrhage is most likely to be confused with the collapse caused by violent abdominal pain. A small dose of morphia administered hypodermically (one-sixth to one-third grain) will relieve the symptoms if they are merely due to pain; if they are due to a persistent condition as continuing hæmorrhage, it will not do so.

A retro-uterine hæmatocele is felt from the vagina as a rounded tumour which fills Douglas' pouch exactly, depressing and almost obliterating the posterior vaginal fornix, and displacing the uterus forward. At first the tumour has a soft, semi-fluctuating, boggy, feel; later on, as the blood coagulates, it becomes of an almost woody hardness. Perhaps the most characteristic point about a hæmatocele is the manner in which the coagulated blood almost entirely surrounds that portion of rectum which has a mesentery. This condition is also met with in the case of an old pyosalpinx, in association with which there is a considerable amount of cellulitis and peritonitis. If the physical signs are entirely relied upon, and the history of the case not taken sufficiently into consideration, these two conditions may be easily mistaken for one another.

A retro-uterine hæmatocele has also to be distinguished from a retroverted gravid uterus and an incarcerated ovarian cyst or myoma. A retroverted gravid uterus is distinguished by the history of the gradual onset of the symptoms, and by the fact that the uterus cannot be palpated as separate from the tumour which fills Douglas' pouch; while in a hæmatocele, the uterus is anteposed to the tumour, and consequently the fundus can be felt anteriorly (*v.* Fig. 94). If a diagnosis cannot be made by a bimanual examination, and the patient's symptoms are urgent, it is better to pass a sound in order to determine the exact relationship of the uterus to the tumour in Douglas' pouch, as the mistake of passing a sound into a retroverted pregnant uterus is not fraught with such dangerous consequences for the patient, as would be that of endeavouring to lift a possibly septic hæmatocele out of the pelvis.

An incarcerated ovarian cyst or myoma can usually be easily diagnosed by the history and symptoms, in addition to the fact, that neither of these growths tends to surround the rectum in the manner which is so characteristic of a hæmatocele, or of old cellulitic inflammation, but rather to flatten it against the sacrum.

Prognosis.—The prognosis depends upon whether the hæmorrhage is encysted or diffuse. The prognosis of diffuse hæmorrhage, which is allowed to continue, is extremely bad. In a small proportion of cases, if only a very small vessel is involved, the bleeding may gradually stop owing to the formation of a clot round the vessel's mouth. Sometimes, this cessation is only temporary, some slight movement of the patient dislodges the clot, and the hæmorrhage commences again. The prognosis after operation and ligation of the bleeding vessels is wonderfully good, when the condition of the patient previous to the operation is taken into account.

The prognosis in the case of hæmatocele which is not removed, varies according to the size of the hæmatocele. All small, and a few large hæmatoceles, are absorbed aseptically. Many large hæmatoceles on the other hand suppurate, and then the danger which they cause is greater than that by operative interference before suppuration occurred.

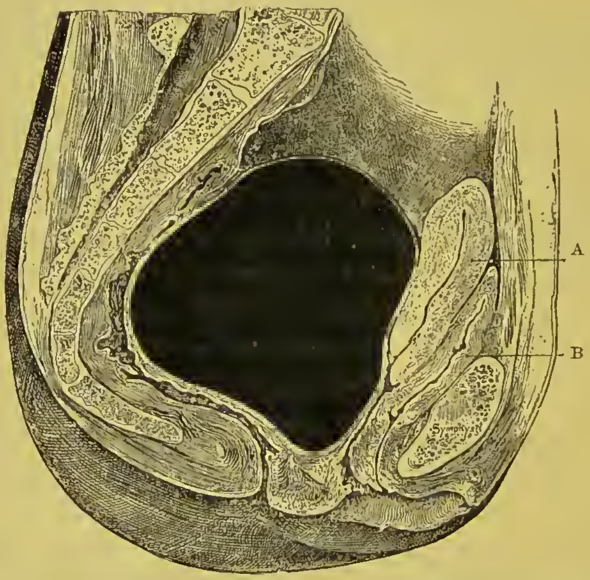


FIG. 94.—Sagittal section of a pelvis showing the effects of a retro-uterine hæmatocele. (*Skene.*) A. Uterus. B. Bladder. (The relations of the bony parts in the diagram must not be regarded as typical.)

Treatment.—As regards the treatment of diffuse hæmorrhage, there is now very little difference of opinion. The only course of procedure, which gives the patient even a fair chance of recovery, is to open the abdomen and remove the ruptured tube as well as the clots with which the peritoneal cavity is filled.

In cases of hæmatocele, all those, which completely fill Douglas' pouch and are large enough to cause pressure on the pelvic organs, should be removed, whether they are suppurating or not, as the likelihood of suppuration occurring is very considerable. If the hæmatocele is aseptic, it is probably best removed by an abdominal cœliotomy, and the injured tube can if necessary be removed at the same time. If it is suppurating, it is certainly better removed by the vagina, as by so doing it is possible to avoid opening into the general peritoneal cavity (*v.* page 395). A small hæmatocele may be left to nature to be absorbed, a process which is facilitated by keeping the patient at rest in bed, and administering hot vaginal douches. If suppuration should occur, the abscess must be opened from the vagina.

II. EXTRA-PERITONEAL HÆMORRHAGE.—The only form of extra-peritoneal hæmorrhage, with which we are concerned, is that which takes place into the layers of the broad ligament. This condition is known as hæmatoma of the broad ligament.

Ætiology.—Extra-peritoneal hæmorrhage is probably always caused by the rupture of a tubal gestation sac. If the tube ruptures in its upper three-fifths—that is in that portion of it which is covered by peritoneum, the effused blood escapes into the peritoneal cavity. If it ruptures in its lower two-fifths—that is in that portion which is not covered by peritoneum, the blood escapes between the layers of the broad ligament. On account of the limiting effect of the peritoneal investment, the hæmorrhage in these cases is not as a rule very serious.

Symptoms.—The symptoms are the same as in intra-peritoneal hæmorrhage but are much slighter in degree, as the amount of blood lost is usually very much less.

Diagnosis.—In the absence of a definite history the diagnosis of hæmatoma of the broad ligament is often very difficult. The intra-ligamentous situation of the tumour can generally be determined by noting the intimate connection which it has with the pelvic wall. An intra-ligamentous parametric exudation usually extends somewhat under the pelvic parietal peritoneum, a hæmatoma rarely does. An intra-ligamentary cyst is as a rule not attached to the pelvic wall, and does not tend to get smaller as a hæmatoma does, but rather to increase in size. In some cases where the rupture has occurred into the left broad ligament, blood may dissect outwards beneath the peritoneum which covers the rectum, and surround this last in such a manner as to simulate a hæmatocele. In such a case, the constricting ring round the rectum would invest the second or subperitoneal portion, and not the first as happens in the case of a hæmatocele.

Treatment.—In the large majority of cases, the only treatment required is to keep the patient at rest, in order to favour the absorption of the effused blood. Suppuration is a very rare complication, as the blood is usually not in contact with an intestine. If such a complication does occur, the abscess should be opened, if possible, from the vagina.

CHAPTER XVI.

GYNÆCOLOGICAL OPERATIONS.

Definitions—Sterile—Aseptic—Antiseptic—Surgical Cleanliness—Sterilisation. Preparation of the Operating Room—Dressings—Sponges—Instruments—Suture Materials—Preparation of Patient—Operator's Hands—Antiseptics—Operating Table and Gynæcological Couch.

Before attempting to perform any operation, except in cases of great emergency, it is necessary to ensure as far as possible that the patient is placed under the most favourable circumstances to resist the danger of the operation. Of these dangers, that which is at once the most formidable and the most readily overcome, if sufficient care is used, is undoubtedly sepsis. In this connection, it is necessary to commence by defining a few terms of everyday use.

By the term *sterile* is meant the entire absence of living micro-organisms. By the term *aseptic* is meant the entire absence of septic organisms. By the term *antiseptic* is meant any substance which is capable of destroying septic organisms. These are all definite terms, but the next term is by no means so definite, *i. e. surgical cleanliness.* The meaning which we should like this term to convey, and the meaning which we are compelled by circumstances to attach to it, are widely different. The object of all research into the different modes of sterilisation is to make surgical cleanliness correspond as closely as possible with sterility. This, unfortunately, it is as yet impossible to do in the majority of cases. Sterility is almost impossible on account of the number of saprophytic organisms which are in the air. The highest form of surgical cleanliness to which we can attain is in the case of those substances which can be exposed to the prolonged action of heat, *e. g.* dressings and instruments, and even here the term is at best usually synonymous with asepsis, while in the case of the operator's hands, or the skin of the patient, we can rarely, if ever, attain to such a height. In their case, the most that can be hoped for is that the external layers of the skin are rendered aseptic, while the deeper layers are still swarming with micro-organisms. Fortunately, as practice proves, this is sufficient. The term surgical cleanliness must then be taken to mean the nearest approach to sterility that can be obtained by the careful carrying out of those methods which experience has proved to be most reliable. The last term, *sterilisation*, is that usually applied to the process by which hands, instruments, etc., are rendered surgically clean. It is obviously not a perfectly correct term, but, inasmuch as it conveys the end at which we are aiming, and so always keeps it before us, it is a suitable one.

Operating Room.—The three main essentials, which should be looked for in selecting a room for an operation, are—light, warmth, and capability of being rendered surgically clean. Of the first, it is necessary to say little. There must be a sufficient light, and, if possible, it should be a north light in order to avoid deep shadows. The temperature of the room should be about 70° F., as a prolonged operation is more easily borne by the patient when carried out in a well-warmed room. An operating theatre in a hospital should be built in such a manner that it can be readily washed out with a hose from top to bottom. All sharp angles or projecting edges should be avoided, on account of the difficulty of keeping them clean. The furniture should be as far as possible of metal, glass, or other impervious substance. There should be a properly regulated system of ventilation, so as to ensure purity of atmosphere without at the same time causing draughts. When operating in a private house, the room must be brought as far as possible into conformity with the foregoing. All hangings, carpets, and unnecessary furniture must be removed. The walls must be swept down and the floor thoroughly scrubbed. An hour or so before the operation the entire room should be dusted out with a *wet* duster, and any carpets or furniture which cannot be removed should be covered with damp sheets.

Dressings.—All dressings, which are not impregnated with a volatile antiseptic, must be sterilised before the operation, and kept in the case in which they were sterilised until the moment for applying them comes. The same remark applies to the towels, sheets, etc., which are used during the operation, and to the operators' coats. The best form of steriliser for this purpose—if there is much to sterilise—is Lautenschläger's steam steriliser. In this, the steam is slightly superheated, so ensuring that it will penetrate into the centre of the contents, and also—owing to its more rapid evaporation—that the towels will be fairly dry when removed. For smaller quantities, the most easily worked steam steriliser is that known as Schimmelbusch's (*v.* Fig. 95).

Sponges.—The sponges, which are used during an operation, must be composed of some substance which is readily sterilisable, and which is of so moderate a cost that there need be no hesitation in destroying them after having been once used. The material known as "butter muslin" answers both these requirements. It is made up into flat pads, usually about six inches square, and containing from four to six thicknesses of the muslin. These are then sterilised in a steam steriliser. The usual time allowed for sterilisation is about thirty minutes, counted from the time the steam has commenced to blow off at the valve.

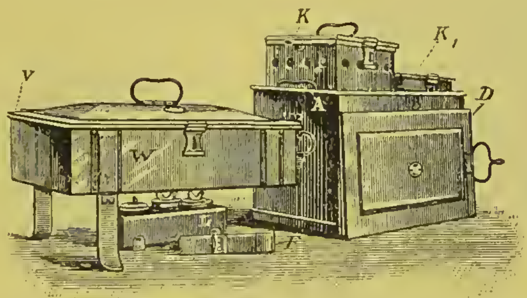


Fig. 95.—Schimmelbusch's steriliser for instruments and dressings. W. Tray for instruments. K and K_1. Caddies for dressings. A. Case to hold K. To use A, the lid, V, of W is removed and placed on A, which then fits on to the top of W. L. Lamp. F. Detachable foot of W.

Instruments.—The sterilisation of instruments is most easily effected by boiling them from ten to fifteen minutes in water containing a little common washing soda—to prevent rust. In order to enable the instruments to stand boiling, they must be of metal. During the operation, they are kept in sterilised water, or in lysol or carbolic lotion, if sterilised water cannot be obtained.

Sutures.—The materials most commonly used for sutures are—silk, silkworm gut, and catgut. Silk is most suitable for use when a strong ligature is required, or when the ligature is required to last for a considerable time. It can be buried in the tissues with safety, if aseptic. It is as a rule best to avoid its use for skin wounds, on account of its capillarity. It is sterilised by boiling for thirty minutes in water, and then is stored in 1 in 20 carbolic lotion.

Silkworm gut is a most valuable suture material for use in places from which it can be subsequently removed. It is especially suitable for skin wounds, on account of its freedom from capillarity. It is sterilised by boiling for twenty minutes in water, and then is stored in 1 in 500 corrosive sublimate lotion.

Catgut is also a most valuable suture material, for use in places from which the suture cannot subsequently be removed. Its great drawback is the difficulty of sterilising it, a difficulty which is so marked that many surgeons have given up its use altogether. While opposed to this conclusion, we are satisfied that the only thoroughly efficient mode of sterilisation consists in subjecting the gut to a sufficient degree of heat, and that the older methods of attempted sterilisation by means of chemical antiseptics are unreliable. The difficulty of applying heat to catgut, without completely destroying it, is considerable, but of late three satisfactory methods of doing so have been described. The first, the cumol method, is extremely troublesome, and necessitates the attention of a skilled assistant. Shortly, it consists in the following steps:—

(1) Wind the catgut in suitable lengths.

(2) Raise it gradually to a temperature of 80° C. (176° F.) in a hot-air oven or sand-bath, and keep it at this heat for one hour.

(3) Place the gut in cumol at a temperature of 100° C. (212° F.), raise the temperature to 165° C. (329° F.), and keep it there for one hour.

(4) Pour off the cumol, and dry the gut in a sand-bath or hot oven at 100° C. for two hours.

The second method consists in immersing the gut in superheated absolute alcohol for the necessary time for complete sterilisation. It was first described by Fowler, and, as slightly modified by the author by the introduction of a suitable apparatus in which to superheat the alcohol, provides an easy and comparatively inexpensive method of sterilisation. The steps are as follows:—

(1) Roll the gut very loosely on round glass or metal reels.

(2) Immerse the reels in absolute alcohol, for the purpose of dehydration. They must lie in this for at least three days.

(3) Place the reels in a special brass box made for the purpose (*v.* Fig. 96), and cover with absolute alcohol. The box is immersed completely in a saucepan of cold water, which is then raised to boiling-point and kept there for thirty minutes.

(4) Remove the reels from the steriliser, and store them in a mixture of sterilised glycerine ten parts and absolute alcohol ninety parts.

If it is desired, the gut can be chromicised prior to dehydration.

The third method—the formalin method—is the simplest of all.

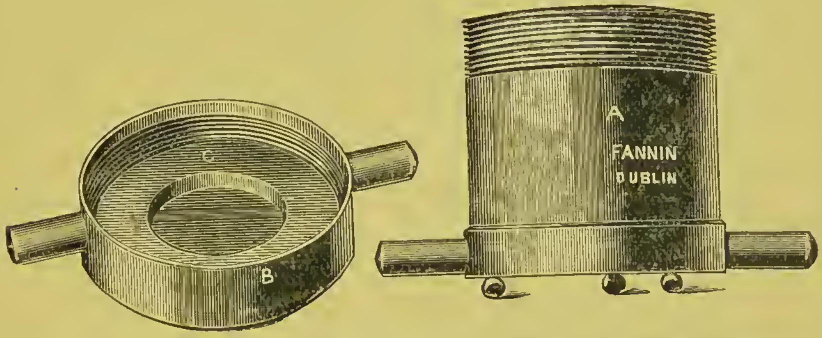


FIG. 96.—Author's catgut steriliser. A. Steriliser. B. Screw Top. C. Rubber washer.

It was introduced by Senn, and is very satisfactory. As modified by C. A. Ball it is as follows:—

(1) Roll the gut firmly and evenly on glass or wooden reels of about an inch in diameter, tie the ends, and immerse the reels in a 5 per cent. solution of formalin for twenty-four hours.

(2) Place the reels under a stream of running water for some minutes, to wash away the formalin.

(3) Store the reels in methylated spirit or absolute alcohol, until such time as required.

(4) Drop the reels into boiling water and boil for from five to ten minutes according to the thickness of the gut.

(5) After boiling store them in the following mixture:—Corrosive sublimate, 1 part; glycerine, 250 parts; methylated spirit, 1000 parts. If the gut is required for immediate use, place the reels in absolute alcohol for a few minutes, in order

to dehydrate the gut a little, and so by reducing its size make it more easy to thread the needles.

The sterilisation of tents for the purpose of dilatation of the cervical canal is usually carried out by immersing them for a week or so in a one per cent. solution of corrosive sublimate in alcohol. They can also be sterilised in the author's catgut steriliser in superheated alcohol.

Preparation of the Patient.—For minor operations on the vagina, the external parts are shaved and thoroughly scrubbed with soap and water; the vagina is douched with creolin lotion and well washed with the fingers and soap. If the peritoneal cavity is to be opened *per vaginam,* the latter must be douched out and plugged with iodoform gauze once or twice the day before the operation; on the morning of the operation, the plugging is removed and the vagina again thoroughly washed and douched. In the case of ventral cœliotomies, on the evening before the operation the patient is given a warm bath, the skin of the abdomen washed with soap and water and finally with ether, and a compress, soaked in a one per cent. solution of corrosive sublimate in glycerine, applied over the proposed site of incision. This compress remains *in situ* until the patient is on the operating table, when it is removed and the skin again washed with soap and water, then with ether, and finally with corrosive sublimate solution 1 in 500.

The Operator's Hands.—The efficient sterilisation of the operator's and his assistant's hands is a matter of some difficulty. After the finger-nails have been cut short, the hands and forearms must be scrubbed for at least ten minutes with hot water and soap, paying particular attention to the skin round the nails. When the soap has been washed off with plain water, they are immersed in corrosive sublimate solution 1 in 500 for a minute or longer. An alternative antiseptic course consists in plunging them, after scrubbing, first into a saturated solution of permanganate of potash until they are of a dark mahogany colour, and then into a saturated solution of oxalic acid until they are decolourised. The oxalic acid is finally washed off with sterilised water or better with sterilised lime-water.

Antiseptics.—The number of antiseptics which have been introduced during the last few years is very great. The following are those most generally used for the disinfection of the hands, for douches, etc. :—

(1) *Corrosive Sublimate.*—This is a reliable antiseptic, if used of a sufficient strength. It is especially suited for the disinfection of the skin. Its use must be avoided in places where there is any risk of absorption taking place, and where it will come in contact with blood or other albuminous discharge by which it is decomposed. The usual strength for skin sterilisation is 1 in 500.

(2) *Biniodide of Mercury.*—This is a valuable and reliable antiseptic. It differs from corrosive sublimate in that its solution instead of constringing the skin renders it soft and slippery, and that it is not so easily decomposed. It is used for skin sterilisation at a strength of 1 in 500 to 1 in 1000.

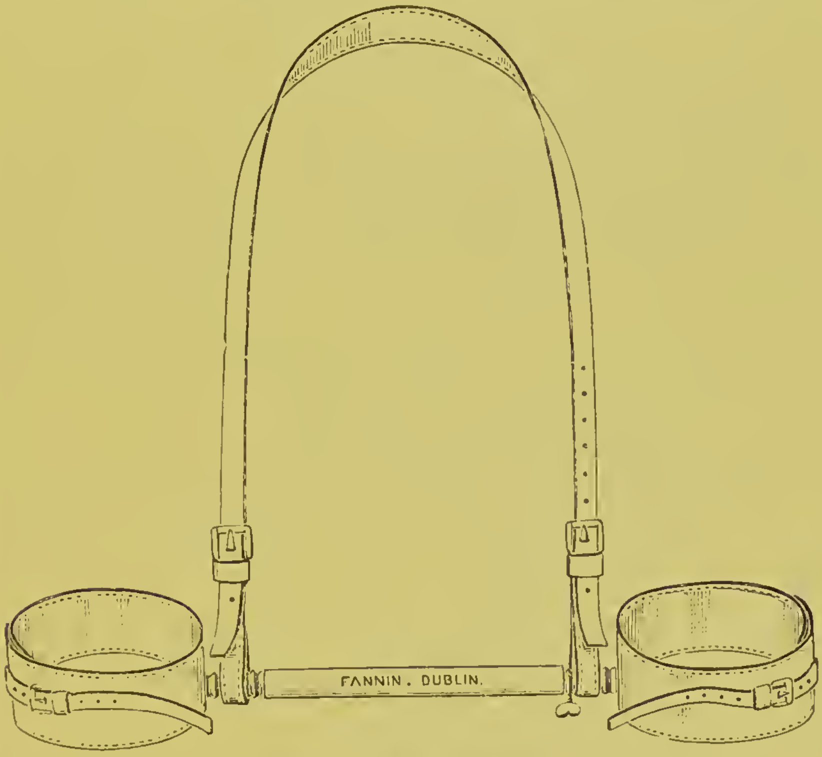


Fig. 97.—Clover's crutch.

(3) *Creolin.*—Creolin is an antiseptic which is particularly free from danger as far as poisonous properties are concerned. It is at the same time a tolerably reliable antiseptic. It is principally of use for douching purposes, and is used at a strength of 1 in 320, or half an ounce to the gallon.

(4) *Lysol.*—Lysol is stated to be almost as powerful an antiseptic as corrosive sublimate. It contains a large proportion of soap, and so in a one per cent. solution is well suited for the cleansing and disinfection of the hands. For the same reason, it is of considerable use as a lubricant in cases where such is required.

(5) *Formalin.*—Formalin—the name applied to a 40 per cent. solution of formic aldehyde—is one of the strongest antiseptics known, and is at the same time comparatively harmless to human life. Two objections to it are, that it is rather volatile and so easily loses its strength when exposed to the air, and that its fumes are extremely unpleasant. It is principally used as a gaseous disinfectant for room sterilisation, for which purpose it is of considerable value.

Operating Table and Gynæcological Couch.—An operating table for abdominal cœliotomies should be as uncomplicated as possible, so that there may be a minimum of trouble in keeping it clean. At the same time, in order to be suitable for all cases, it must be capable of adjustment as regards its height and its inclination to the floor. It must be entirely of metal, or of glass and metal. An excellent table, which fulfils these requirements, is that designed by Mackenrodt.

For pelvic examinations and operations on or through the vagina, a gynæcological couch and not an operating table is required. The most generally useful form is that known as the Veit-Schroeder gynæcological couch (*v.* Fig. 1). If such a couch cannot be obtained, as when operating in a private house, the patient can be kept in the necessary positions by means of Clover's crutch (*v.* Fig. 97).

Marion Sims' position is possibly of use in a few cases, as when removing sutures from the cervix. There are, however, now but few operators who adopt it for operative purposes.

CHAPTER XVII.

CŒLIOTOMY.

Definition—Ventral Cœliotomy—Indications, Instruments, Operation: Drainage; Closure of the Abdominal Wound; Kelly's Method — Operative Complications—After-treatment; Rest, Diet, Bladder, Intestinal Tract, Dressing of Wound—Post-operative Complications—Vaginal Cœliotomy—Relative Advantages of Vaginal and Abdominal Cœliotomy—Indications, Instruments, Operations; Anterior Colpotomy, Mackenrodt's Operation, Dührssen's Operation; Posterior Colpotomy.

Cœliotomy (κοιλία, *lit.* a hollow, *hence* the abdomen; τέμνω, I cut; *syns.*, laparotomy [λαπάρα, the flank; τέμνω], abdominal section) is the term applied to the opening of the peritoneal cavity. It can be divided into ventral or abdominal cœliotomy and vaginal cœliotomy, according as the opening is made through the abdominal walls or through the vagina.

VENTRAL CŒLIOTOMY.

In a gynæcological handbook, we are only concerned with that form of ventral cœliotomy which is required for the cure of gynæcological conditions, *i. e.* the opening of the peritoneal cavity through the linea alba.

Indications.—Ventral cœliotomy is indicated if vaginal cœliotomy is either impossible or unsuitable:—

(1) In order to treat or remove pathological conditions of the uterus or appendages, when the cure of such conditions is necessary and cannot be obtained by less radical means.

(2) In order to diagnose and treat or remove obscure intra-peritoneal conditions, which so affect the patient's health as to render their cure necessary.

Instruments.—The following instruments are required:—Two scalpels; a dozen clip forceps; three pairs of scissors, one sharp-pointed, one blunt-pointed, and one curved on the flat, all tolerably stout and with handles of medium length; retractors (*v.* Fig. 98), four or five long, straight and curved, narrow-bladed clamp-forceps (*v.* Fig. 111); a couple of sponge-holders; two, toothed fistula forceps (*v.* Fig. 112); three or four dozen sponges of gauze; needles and holders; suture materials; two short, and two long, dissecting forceps with sharp teeth (*v.* Fig. 115).

Operation.—Whatever form of operating table is chosen, it should be one which can easily be swung on a transverse axis, so as to permit of the patient being placed in Trendelenburg's position and brought back again to a horizontal position with the least amount of trouble. The patient is placed on the table, the skin disinfected as previously described (*v.* page 232), and the site of operation isolated from the surrounding parts by means of sterilised towels. An incision is made in the middle line through the skin and fat down to the aponeurosis of the rectus muscle, and is at first about two to two and a half inches in length, with its extremities equidistant from the umbilicus and pubes. Afterwards, it can be increased as necessary. As soon as the aponeurosis of the muscle has been exposed, the linea alba (*v.* Fig. 99) must be found, as it is through it the incision is to be continued. The easiest way to do this is to make a very small cut through the aponeurosis as nearly as possible in the middle line, and at the upper end of the exposed aponeurosis, as there the linea alba is best marked and can be most easily recognised. If this happens to hit the linea alba, then it is continued through it. If it does not, the point of a director is

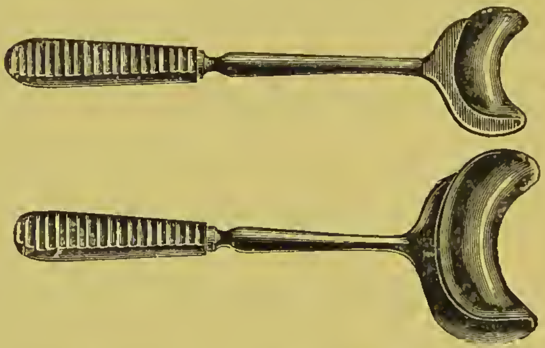


FIG. 98.—Doyen's retractors for the edges of the abdominal wound.

passed through it, and pushed alternately first towards one side and then towards another. In this way, the linea alba will be found, as it will cause an obstruction to the passage of the director to one or other side, while the director can be freely passed in the opposite direction. The accompanying drawings, made from sections of the abdominal wall in a virgin, show very clearly the alteration in the thickness and width of the linea alba at different levels between the umbilicus and the symphysis. As soon as the linea alba has been traversed, the subperitoneal fat is met. This may either be divided with the scalpel or torn through with the handle end, or it may be picked up between two clip forceps and divided. Finally, the peritoneum is reached and is recognised by touch, if a fold is picked up between the finger and thumb. Such a fold is then caught between two clips, and a very small nick made in it with the scalpel. This allows air to rush in, and the intestines, if not adherent to the parietal peritoneum, fall back, leaving the peritoneum completely separated from them.

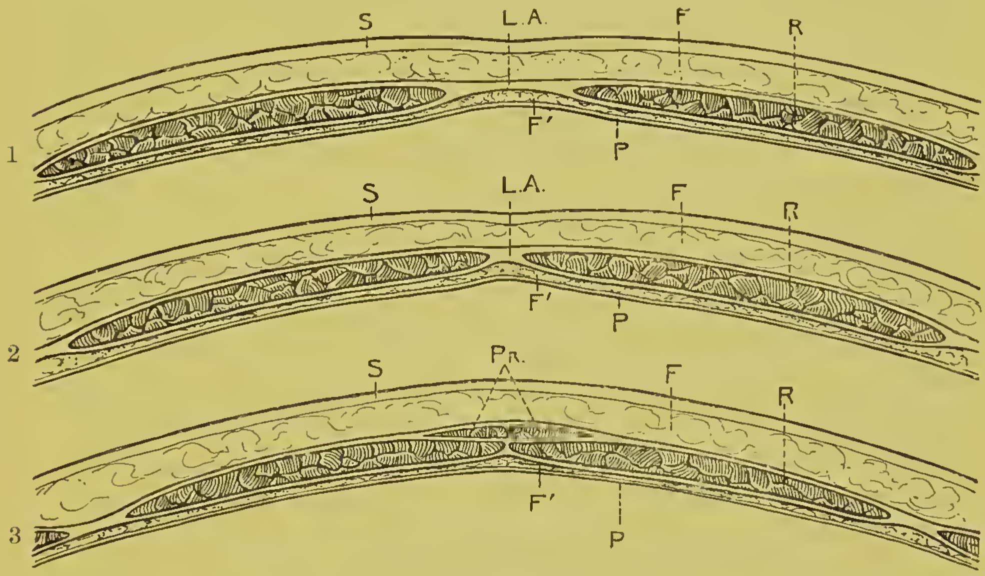


Fig. 99.—Sections of the anterior abdominal wall across the middle line and at right angles to the linea alba. 2. Section midway between umbilicus and symphysis pubis. 1. Section midway between umbilicus and 2. 3. Section midway between 2 and symphysis pubis. L. A. Linea alba. S. Skin. F. Subcutaneous fat. F′. Sub-peritoneal fat. R. Rectus muscle. Pr. Pyramidalis muscle. P. Peritoneum. (From a formalin preparation by Dr. R. A. Stoney.)

The patient may now be placed in Trendelenburg's position, if this has not been already done, as it is the most suitable position for almost all gynæcological operations. The incision in the peritoneum is then sufficiently enlarged with the scalpel to admit the finger, and, finally, the aponeurosis and peritoneum are divided with scissors, cutting under the guidance of the finger in the peritoneal cavity, to correspond with the size of the wound in the abdominal wall. If the incision has to be enlarged, owing to the size of the tumour or for any other reason, such enlargement is carried out in a similar manner, that is, the skin is divided with a scalpel, and the deeper tissues with the scissors.

As soon as the object for which the peritoneum was opened has been carried out, the peritoneal cavity must be cleansed by removing all blood and *débris* of any kind which may have found its way into it. As a preliminary to this, it is well to bring the patient back again from Trendelenburg's position into the horizontal, in order that all fluid may find its way into the pelvis. As a rule, gauze sponges will readily remove any fluid or clots, and it is only in rare cases that it will be found necessary to wash out the peritoneal cavity. If septic matter has escaped from a pus tube or suppurating cyst, and has become generalised through the peritoneal cavity, it is best to wash the latter out as thoroughly as possible. If, however, the septic matter does not become generalised but has been successfully confined to the pelvis, by careful walling off the rest of the peritoneal cavity with sponges, it is probably better not to wash out the cavity, lest such a procedure should tend to cause the poison to become generalised. If the patient is very much collapsed from the length of the operation and from loss of blood, it is a good practice to infuse from two to six pints of normal saline solution (0·6 per cent.) into the cavity and allow it to remain and be absorbed.

Drainage. — The very important subject of post-operative drainage of the peritoneal cavity demands some little attention. In the early days of abdominal sections, it was considered necessary to drain every case, as a presumed safeguard against septic peritonitis. Gradually, however, it came to be recognised that aseptic operations, at any rate, such as hysterectomy for a myoma, did not require drainage, but rather ran a more normal post-operative course if drainage was not adopted. On the other hand, certain cases, such as those in which the peritoneal cavity is infected, apparently require drainage, and accordingly two questions must be answered :—

(1) In what cases is drainage required ?

(2) How is drainage best obtained ?

(1) In what cases is drainage required ? It may be regarded as definitely settled that the routine use of the drain has entirely passed away. Experimental research has gone a long way to show that the normal peritoneum is capable of absorbing large quantities of fluid (Wegner) and minute particles of foreign matter (Muscatello) in a very short time, and also of getting rid of immense numbers of pyogenic bacteria (Waterhouse, Halsted). On the other hand, experimental research also tends to show that in cases where the absorptive power of the peritoneum is damaged, and where as a consequence collections of unabsorbed serum or blood are present in various parts of the cavity, bacteria can multiply to a sufficient extent to give rise to a fatal peritonitis. The use of a drain is never free from danger. It may act as a means of introducing fresh infection from outside. It may cause injurious pressure on the intestines, and so produce intestinal obstruction or fistulæ. If it comes out through the abdominal wound, it weakens the future union at that point and paves the way for a hernia. For these reasons, it must be regarded as a line of treatment whose general effect is by no means beneficial, but which may have to be used at times in order to guard against a greater danger. There is one class of case in which most authorities agree that drainage is necessary. That is, when septic matter has escaped into the peritoneal cavity and when both it and its origin cannot be entirely removed; *e.g.* when a pyosalpinx or other collection of pus, which there is reason to believe is still septic, bursts prior to removal, or when it is not possible to remove the entire sac of an abscess cavity. Another class of case, in which many authorities consider drainage necessary, is when the amount of general oozing from surfaces denuded of peritoneum is so great, that, if not drained, a considerable accumulation of blood-stained serum would result. The author is not now referring to cases in which the use of an intra-peritoneal *plug* is necessary to check hæmorrhage, such cases come under another head, but solely to the use of a drain to prevent the accumulation of serum. For these

latter cases, it is not possible to lay down a definite rule. The peritoneum, if healthy, can apparently be trusted to absorb very large amounts of fluids, but if, on the other hand, its function is destroyed—as by former peritonitis—drainage is called for. Accordingly, two indications may be laid down for the use of the drain:—

(*a*) Where undoubtedly septic matter is present, or is likely to make its way into the peritoneal cavity.

(*b*) Where sterile matter—blood, serum, or pus—is likely to collect in quantities greater than the peritoneum in its existing condition can be expected to absorb.

(2) How is drainage best obtained? Drainage can be carried out either through the lower angle of the abdominal wound, or through an opening made from the floor of Douglas' pouch into the posterior vaginal fornix. The latter route offers great advantages, as the weakening of the abdominal cicatrix is avoided, and the action of gravity assists the escape of the fluid. It however possesses the disadvantages that it necessitates the making of an opening into the vagina when perhaps the condition of the latter is not suitable for such a procedure, and that the subsequent removal of the drain is more difficult. Nevertheless, if the vagina is healthy, vaginal drainage is the correct treatment in almost every case in which a drain is required. In a small number of cases, it may be found advisable to have a counter-opening in the lower angle of the abdominal wound; while, in those cases in which a gauze plug is introduced with the object of checking hæmorrhage by its pressure, it will be best inserted and removed from above. All the various forms of drain which we have at present at our disposal are more or less unsatisfactory. Both glass and rubber tubes are inefficient, and in addition glass is dangerous as tending to produce fæcal fistulæ by causing pressure on the intestines. Gauze, which drains well at first—if used in sufficiently large quantities, ceases to drain after a time owing to its meshes becoming blocked by fibrin and lymph. It is, however, the only material which is at all suitable. Either plain sterilised gauze, in the form of long four-fold strips two inches in width, may be used, or iodoform gauze from which the excess of iodoform has been removed by squeezing it out of water (Kelly). The latter is to our mind preferable, as the fluid

absorbed by the gauze rapidly decomposes, unless some antiseptic is present. If it is intended to remove the gauze by the vagina, the end is first passed through the vaginal opening, and then the pelvis is filled with the remainder, care being taken that a loop of intestine does not lie below or amongst it. In some cases, the form of drain known as "Mikulicz bag," is most useful, especially if it is desired to obtain firm pressure on any bleeding area. This consists of a large piece of gauze about eighteen inches square, with a tape sewn firmly into its centre. The gauze is inverted over the fingers or a plugging forceps, with the tape on the inside, and passed into the pelvic cavity so as to line Douglas' pouch, while the edges of the gauze remain outside the abdominal opening. These edges are then held by an assistant, and the cavity of the bag thus formed is filled as tightly as is required with a long strip of gauze (*v.* Fig. 100). This gauze packing should be removed on the morning or evening of the next day, and the bag itself the day following.

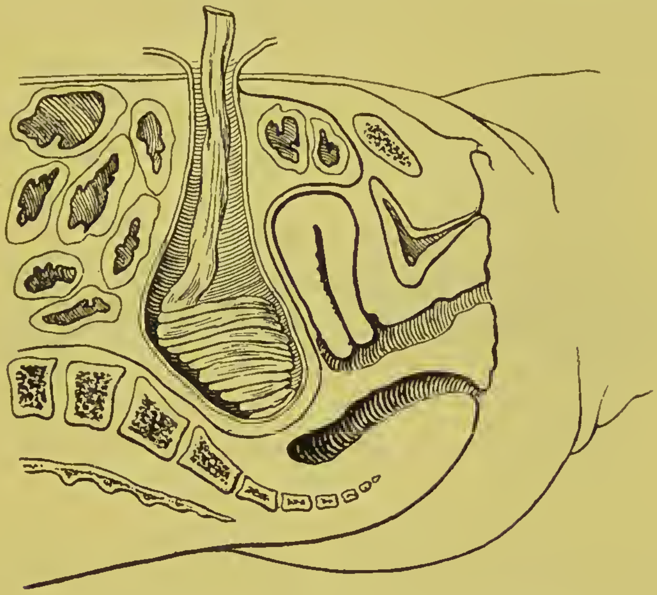


Fig. 100.—Diagram of Mickulicz gauze bag *in situ.*

The Abdominal Wound.—The proper closure and resultant complete union of the abdominal wound are most important matters, in order to guard against the subsequent occurrence of ventral hernia. "The best method of closure is that which brings the tissues into exact approximation layer by layer in the order they occupied before division, and holds them there until firmly united, with the least risk of infection" (Kelly). There are two chief ways of attaining this end. The first is the more rapid and has the advantage that no permanent buried sutures are left behind. It is therefore suitable for cases in which the saving of time is of great importance, or in which there is a risk of septic infection of the abdominal wound occurring, as, if such infection should occur, the presence of buried silkworm-gut sutures tends to indefinitely prolong suppuration. In all other cases, the second method is preferable, as it ensures a more accurate approximation of the fascia than can be obtained by the first method.

The first method is as follows:—The peritoneal edges are brought together by a continuous catgut suture. Silkworm-gut sutures are then inserted at intervals of half an inch, traverse the skin, fat and fascia at one side, then pass across the wound to the corresponding point at the opposite side, and finally emerge through fascia, fat and skin. They are entered a quarter of an inch from the skin edge, and traverse the fat and fascia at a corresponding point. If there is any gaping of the skin between them after they are tied, fine catgut or silkworm-gut sutures may be inserted between them wherever necessary (*v.* Fig. 101).

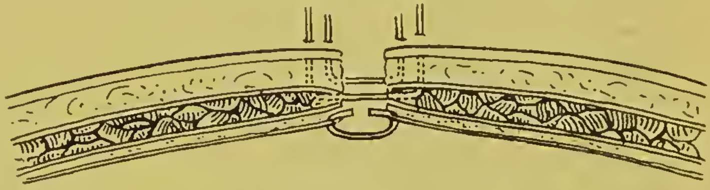


FIG. 101.—Diagram of the simplest method of suturing the abdominal wound.

The second method (Kelly's) is as follows:—The peritoneum is first sutured with a continuous catgut suture. The fascia is then drawn out on both sides, and held together while it is united with mattress sutures of silkworm gut. These are passed 12 mm. (·5 in.) from the cut edge, embrace 12 mm. of the tissue, and lie about 2 or 4 cm. (1—1·5 in.) apart. Their ends are cut off short, as they will be buried when the subsequent sutures are passed, and interrupted catgut sutures are inserted between them. The subcutaneous fat is next brought together by means of a continuous catgut suture, and lastly the skin by a continuous subcuticular suture of the same material (*v.* Fig. 102, A, B).

A simple method by which the use of catgut for the superficial sutures is avoided is as follows:—Two long and fine silkworm-gut sutures are knotted together. A straight glover's needle is threaded with one end of the double ligature and passed through the skin in the middle line half an inch above the upper end of the wound. The needle emerges through the subcutaneous fat, and is then passed through the fat at each side of the wound alternately, in such a manner that, when the suture is drawn tight, the cut edges of fat are, as it were, laced together. The suture finally emerges through the skin half an inch below the lower end of the wound. The needle is then threaded with the other end of the double ligature, which is lying loose at the upper end of the wound, and is passed through the skin just beside the point at which the first suture was introduced. It then traverses the wound from above downwards, passing through the sub-cuticular layers of the skin alternately at each side, in such a manner as to lace the cut edges together. It emerges beside the first suture, and then the two are drawn sufficiently tightly to accurately bring together the cut edges and are knotted to one another. Their subsequent removal is easy, as all that has to be done is to cut off the knot at one end, and then by pulling on the other end each suture can

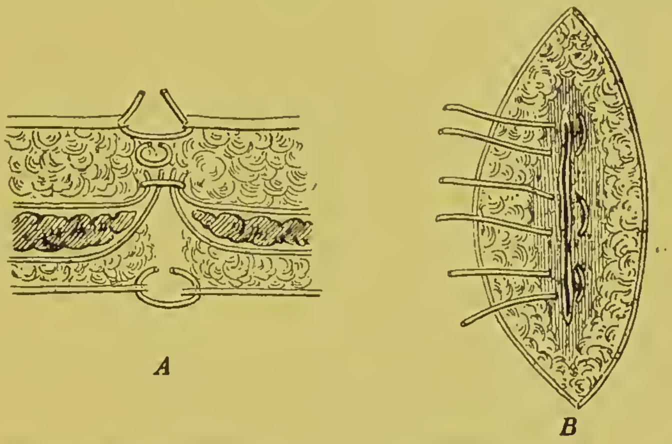


FIG. 102.—Kelly's method of suturing the abdominal wound. A. The different layers of sutures *in situ*. B. The mattress sutures which unite the aponeurosis.

be drawn out separately. If the gut used is fine, this procedure causes little or no pain.

The final step of the operation consists in cleansing the skin of the abdominal wall and in dressing the wound. If the operation has been an aseptic one, the skin is made as dry as possible and covered with sterilised gauze sponges, no antiseptic being necessary. If, however, there has been pus about, it is well to first powder the incision with some antiseptic, and for this purpose iodoformogen, glutol, iodoform, or boracic acid may be used. Three or more straps of adhesive rubber plaster are then placed over the sponges, of sufficient length to get a firm hold of the skin at the sides. A layer of absorbent cotton wool or cellulose comes next over the strapping, and outside all an abdominal binder.

Operation Complications.—The only complication which is likely to occur in the course of a ventral cœliotomy is the wounding of an intestine when the peritoneum is being opened, or during the separation of adhesions. This is an accident which is especially liable to occur in cases where the intestine has become adherent to the abdominal wall in the middle line as the result of former peritonitis. If it happens, the cut must be immediately sutured with an ordinary fine sewing needle—as it will make the smallest holes—and very fine silk or catgut. The sutures, which may be continuous, mattress, or interrupted, are passed in the manner introduced by Lembert, taking particular care to include a portion of the submucous coat (Halsted). If the tear is situated in the rectum, a fine curved needle is used instead of the usual straight one. Although a rectal tear is always difficult to reach, this fact is compensated for to some extent by the thickness of the wall rendering the sutures more easy to insert.

After-treatment.—The after-treatment of abdominal sections is best considered under various headings :—

Rest.—After the operation the patient must be kept as quiet as possible. Violent movements while she is still semi-unconscious must be guarded against, and a special nurse must be in attendance who will not leave the patient for a moment until she is replaced by another. On the day following the operation, the patient may be carefully turned a little to one or other side by the nurses, but she must not be allowed to move herself.

Diet.—For the first twenty-four hours, the less that is given by the mouth the better. Thirst may be relieved by hot water one or two teaspoonfuls at a time, by sips of champagne, or perhaps by ice. If the patient is very weak, nutrient enemata must be given every four hours, and the hot water may be replaced by whiskey and water (one in three). As soon as vomiting has ceased, the hot water may be replaced by barley-water, and it in turn by milk and water or barley-water, or beef essence and chicken broth may be given as an alternative. As soon as the bowels have moved, the patient may be allowed a little solid food,—tea and toast, a very small portion of the white meat of chicken, and light puddings containing eggs. As convalescence gets more advanced, the dietary may be made more extensive, but it is a good rule for the first week never to give more than one kind of food at each meal.

Bladder.—The urine must, at first, be drawn off every eight hours, and the amount measured and noted. The catheter must be passed by sight, after carefully washing the external parts. The patient should be got to pass water naturally as soon as possible, to avoid the continued use of the catheter.

Intestinal Tract.—It is an important matter to note when the patient passes flatus for the first time after the operation, as it shows that the intestines are not obstructed or paralysed. A purgative should be given on the second morning or evening after the operation, as the action of the intestines very much relieves the patient, and probably accelerates the absorption of fluid from the peritoneal cavity. If the patient is inclined to vomit, the most easily borne medicine is calomel in small repeated doses. Commence with three grains, followed in two hours by two more, or give repeated doses of one grain every two hours until five have been given. This may be followed three hours after the last dose by a mild saline, such as a teaspoonful of effervescing citrate of magnesia. If the bowels still do not act, a simple soap and water, or better, a turpentine and oil enema must be given. If the patient has no tendency to vomit, a drachm of sulphate of magnesia dissolved in two to four teaspoonfuls of water may be given, instead of the calomel, every two hours until the bowels move. Tympanites is sometimes very marked, and causes the patient a great deal of discomfort. If it is not the result of some serious condition, such as septic peritonitis or paralysis of the bowel, it can usually be relieved by the insertion of a short rectal tube, which is allowed to remain in for half an hour or so, and by turpentine enemata. If the tympanites is very marked, relief is sometimes obtained, while waiting for the bowels to act, by applying a turpentine stupe to the abdominal wall, or by lightly drawing over the latter the point of a Paquelin's thermo-cautery heated to a dull red, in such a manner as to touch the short hairs of the skin without actually coming in contact with the epidermis itself (Kelly). If the distension has reached as low as the descending colon, relief may be given by the passage of the long rectal tube. It is, however, a very difficult matter to get this tube above the sigmoid flexure, but it has been successfully done with the patient in the knee-chest position.

Dressing of the Wound.—The abdominal wound ought not to be dressed until the eighth day, unless either a drain has been used, or the temperature goes above 100·5° or the pulse above 100. The sutures are removed on that day, the wound is redressed, and, if properly healed, is not again interfered with until this second dressing either gets soiled or falls off. The patient may be allowed to sit up in bed, if all goes well, on the tenth to the fourteenth day, and to get up on some day between the fourteenth and eighteenth according to the nature of the case and the length of the abdominal incision.

Post-operative Complications.—The following are the principal post-operative complications which may occur during the three weeks succeeding a cœliotomy. It is not possible to discuss them here in detail, and accordingly the reader is referred to one of the large text-books of gynæcology for the necessary information:—

(1) Collapse due to the length of the operation and the anæsthesia, prolonged handling of the intestines, or hæmorrhage during the operation.

(2) Secondary hæmorrhage coming on at any time up to forty-eight hours after the operation, due to slipping of a ligature or to extensive oozing from a raw surface.

(3) Septic peritonitis and pneumonia, septicæmia and pyæmia.

(4) Re-opening of the wound from excessive coughing or vomiting, or from septic infection. This is most prone to occur within twenty-four hours of the removal of the sutures.

(5) Intestinal paralysis and obstruction. The former is due

to excessive handling of the intestines or to their prolonged exposure during an operation; the latter to peritoneal adhesions, adhesion of the bowel to a raw surface, adhesion to a septic area, incarceration through a hole in the mesentery or omentum, or a twist of a loop of bowel about its own axis.

(6) Pulmonary embolism, due to the detachment of a clot from some large thrombosed vein, may occur from ten days to three or four weeks after the operation. It is an accident which is relatively more frequent after operations for the removal of myomata on account of the enormous veins which are sometimes divided.

(7) Urinary suppression may occur as the result of the accidental ligation of one or both ureters, or of the failure of the action of the kidneys due to the effect upon them of the anæsthetic, of the length of the operation, or of septic infection.

(8) Fæcal or urinary fistulæ may form as a result of direct injury to the intestinal or bladder wall during the operation, or of necrotic or sloughing changes after it.

VAGINAL CŒLIOTOMY.

Vaginal cœliotomy (*syns.*, colpotomy [κόλπος, the vagina; τέμνω], vaginal section) is an operation which furnishes a means of operating upon certain pelvic conditions with greater safety, and, in some cases, with greater ease, than does ventral cœliotomy. The opening into the peritoneal cavity can be made either through the anterior vaginal fornix, after separating the bladder from the uterus (anterior colpotomy), or through the posterior fornix, by opening directly into Douglas' pouch (posterior colpotomy) (*v.* Fig 103).

A few words must be said with regard to the relative value of vaginal and ventral cœliotomy, especially as their relations have not as yet been definitely agreed on. Operating by the vaginal route possesses the following advantages:—

(1) There is apparently less risk of sepsis.

(2) There is little or no interference with the intestines.

(3) If pus is present, it is less likely to spread to the general peritoneal cavity, and after its evacuation a more dependent drain can be obtained.

(4) There are some conditions which can be more easily reached by this route.

(5) There is no subsequent abdominal scar, and no risk of hernia.

The disadvantages of operating by this route are :—

(1) The operation takes longer, as a rule.

(2) In women who have not borne children, the narrowness of the vagina frequently necessitates preliminary dilatation or incision.

(3) After the peritoneal cavity has been opened, it may be found impossible to remove the tumour on account of its size, its situation, or the nature of the adhesions which hold it.

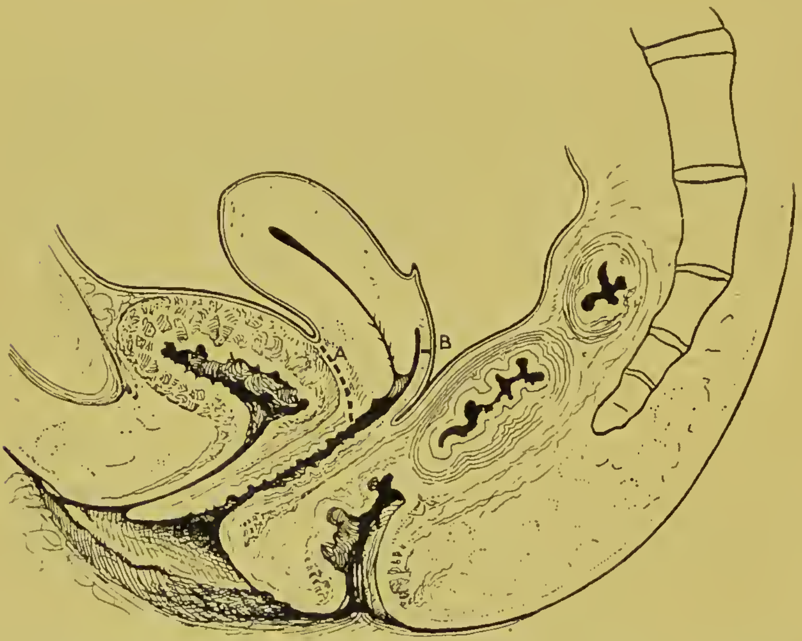


FIG. 103.—Sagittal section through the pelvis of a virgin, showing route followed in anterior and posterior colpotomy. A. Route in anterior colpotomy. B. Route in posterior colpotomy. (From a dissection by Dr. R. A. Stoney.)

(4) If anterior colpotomy has been performed, it is usually necessary to finish the operation by suturing the uterus to the anterior vaginal wall, and in some cases this is an objectionable proceeding (*v.* page 88).

Taking into consideration these advantages and disadvantages, it will, the author thinks, be found that, in certain cases, vaginal is to be preferred to ventral cœliotomy. Even if, after performing vaginal cœliotomy, it is found that the tumour cannot be removed and hence that a ventral cœliotomy is necessary, the prognosis of the case will not be appreciably more serious than if a ventral cœliotomy alone had been performed.

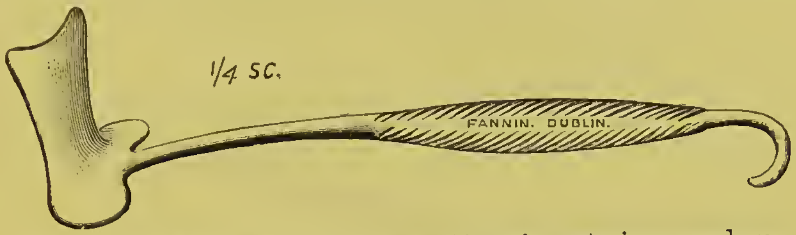


Fig. 104.—Martin's modification of Simon's posterior speculum.

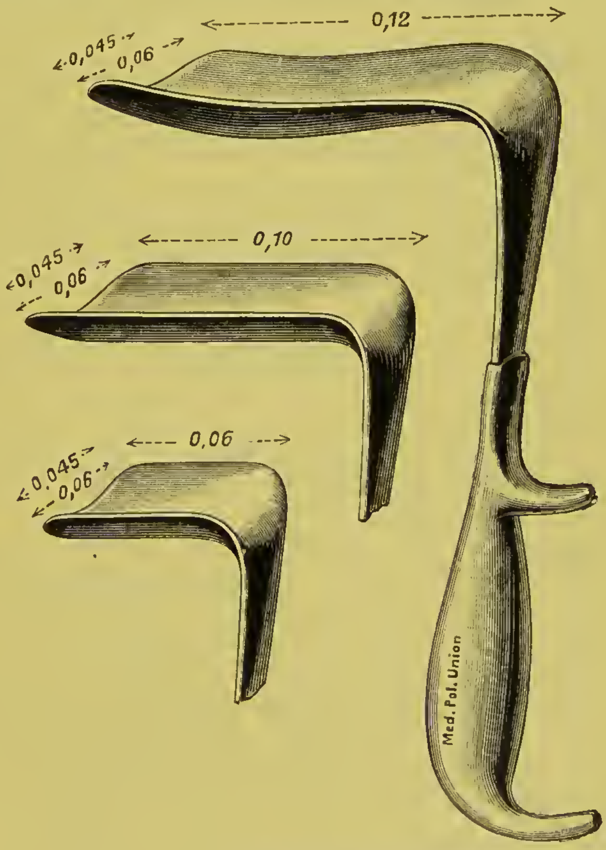


Fig. 105.—Doyen's posterior speculum.

It is not an easy matter to lay down rules as to what constitutes a suitable case for the vaginal operation, and it will doubtless be often found that it is only during the operation itself we can definitely determine this point. In general, vaginal cœliotomy is relatively easy under the following conditions:—

(1) If the vagina is sufficiently capacious to permit the necessary manipulations. Other things being equal, a multipara is always a more suitable subject than a nullipara.

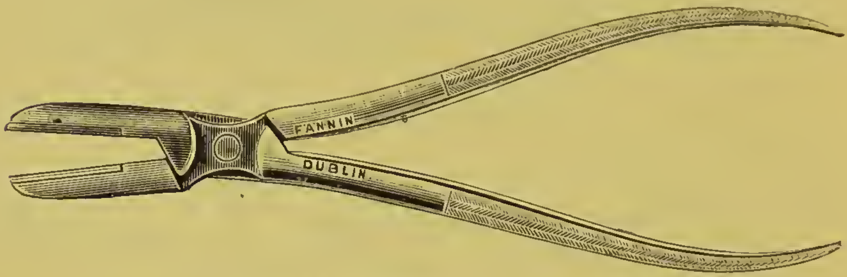


Fig. 106.—Martin's needle-holder. Not quite half scale.

(2) If the tumour to be removed is of such a size, or capable of being so reduced in size, that it can be brought through the vaginal opening, and has no attachments above the pelvic brim.

(3) If the cervix can be drawn down at least as far as the orifice of the vagina.

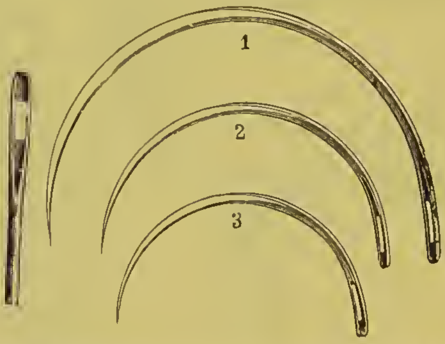


Fig. 107.—Martin's needles for gynæcological work. Actual size.

Indications.—Vaginal cœliotomy is indicated, when the above conditions are fulfilled, as an alternative to abdominal section for the following purposes:—

(1) The removal of myomata or ovarian tumours of small size.

(2) The evacuation of collections of pus in Douglas' pouch, or under the pelvic peritoneum.

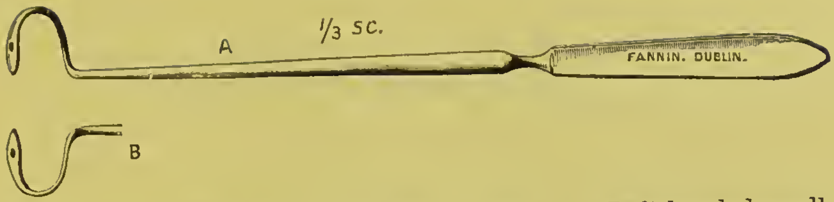


Fig. 108.—Right-angled pedicle needle; blunt. A. Left-handed needle. B. Right-handed needle.

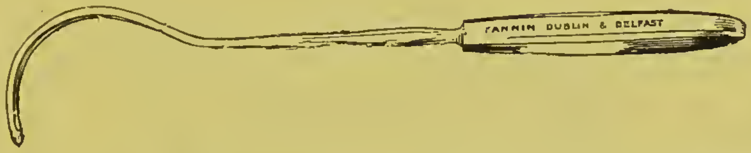


Fig. 109.—Curved pedicle needle for vaginal work; blunt. Half scale.

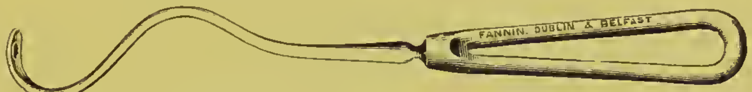


Fig. 110.—Olshausen's pedicle needle. One-third scale.

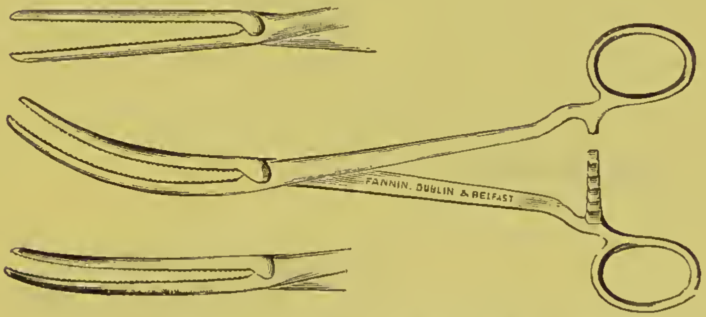


Fig. 111.—Péan's hysterectomy forceps. One-third scale. The highest forceps is straight, the middle curved on the side, the lowest curved on the flat.

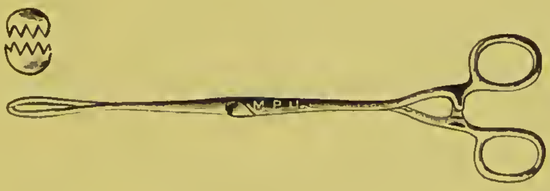


Fig. 112.—Fistula forceps; useful for holding peritoneal flaps, etc. About one-fourth scale.

(3) The drainage of collections of pus, or the removal of the appendages in cases of acute salpingo-oöphoritis, when immediate operation is necessary.

(4) Conservative operations on the ovaries or Fallopian tubes.

(5) The performance of hysteropexy in certain cases.

(6) The performance of hysterectomy in certain cases.

Posterior colpotomy is the more suitable form of the operation in the case of fluid accumulations or inflamed adherent appendages in Douglas' pouch, or of tumours growing from the posterior uterine wall. It is also probaby the better form of operation for small ovarian cysts.

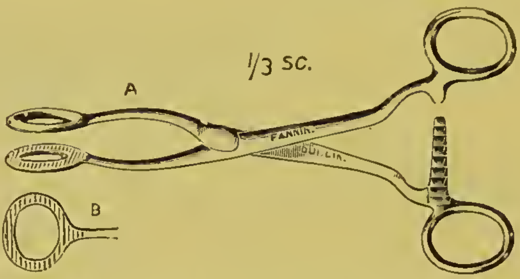


FIG. 113.—Doyen's ovarian extraction forceps.

Anterior colpotomy, on the other hand, must be performed when vaginal fixation of the uterus is required, and is more suitable in the case of tumours growing from the anterior uterine wall or of conservative operations on the ovaries.

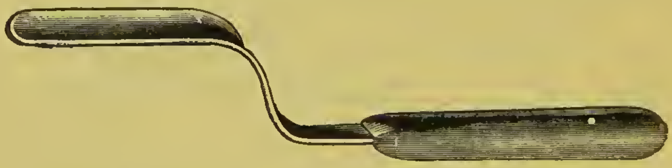


FIG. 114.—Doyen's anterior retractor, or *écarteur*, for vaginal cœliotomy.

Instruments.—The following instruments are required in all cases :—a suitable sized posterior speculum, Martin's or Doyen's (*v.* Figs. 104, 105) ; four American forceps (*v.* Fig. 7) ; needle-holder (*v.* Fig. 106) ; three sizes of whole-curved needles (*v.* Fig. 107) ; silk, silkworm gut, and catgut ; pedicle needles (*v.* Figs. 108—110) ; eight to twelve clip forceps ; three or four long narrow-bladed clamp forceps, curved and straight (*v.* Fig. 111) ; two, toothed fistula forceps (*v.* Fig. 112) ; special ovarian extraction forceps (*v.* Fig. 113); two lateral vaginal retractors, and an anterior retractor or *écarteur* (*v.* Fig. 114); uterine sound; metal catheter; several pairs of scissors, including a pair with blunt ends, a sharp-pointed pair with medium length handles and tolerably stoutly made, and two pairs with long handles, one straight the other curved on the flat; any form of sponge-holder, and a couple of dozen sterilised muslin or cotton-wool sponges; two scalpels; toothed dissecting forceps (*v.* Fig. 115).

In addition, if there is considered to be any likelihood of a ventral cœliotomy being also necessary, the instruments required for it must be at hand (*v.* page 236).

Operation.—Vaginal cœliotomy is most easily performed with the patient in a Schroeder's gynæcological chair; but, if the latter is not at hand, a short deal table will answer the purpose provided that it is sufficiently strong. If a table is used, the patient is kept in the gynæcological position by means of Clover's crutch, or the legs are held by assistants.

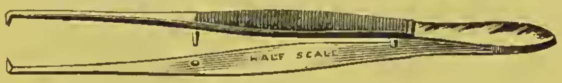


Fig. 115.—Mouse-toothed dissecting forceps. Half scale.

Anterior Colpotomy.—A posterior speculum is passed, and the cervix seized in one or two American forceps and drawn downwards and backwards as far as possible. A sound or metal catheter is then passed into the bladder, and pushed gently in the direction of the cervix in order to ascertain how far downwards the bladder extends. The mucous membrane of the anterior vaginal wall is seized in another forceps a little below the orifice of the urethra, and both forceps are given to an assistant to hold. By drawing the one upwards and the other downwards, the mucous membrane between them is made tense. An incision is next made in the middle line, extending from half an inch below the upper forceps to just below the point to which the bladder had been found to extend (Mackenrodt). If, as sometimes happens, the bladder does not come on to the cervix at all, the incision ends about half an inch from the tip of the cervix. Care must be taken that the incision goes completely through the thickness of the mucous membrane, but no further. A second incision is next made across the cervical end of the first, at right angles to and bisected by it, and about three-quarters of an inch in length (*v.* Fig. 116).

The mucous membrane at one side of the vertical incision is then caught in a toothed dissecting forceps and reflected outwards for about half to three-quarters of an inch, and similarly at the other side. The commencement of the reflection may be made with the sharp end of the scalpel, but as we get further out it is best to use the blunt end only. The outlines of the bladder are then again defined by passing the sound into it, and a transverse incision is made through the areolar tissue just below the cervical attachment of the bladder (*v.* Fig. 117). This incision should extend down to but not into the cervical tissue, as its object is to open the loose tissue that lies between the bladder and cervix.

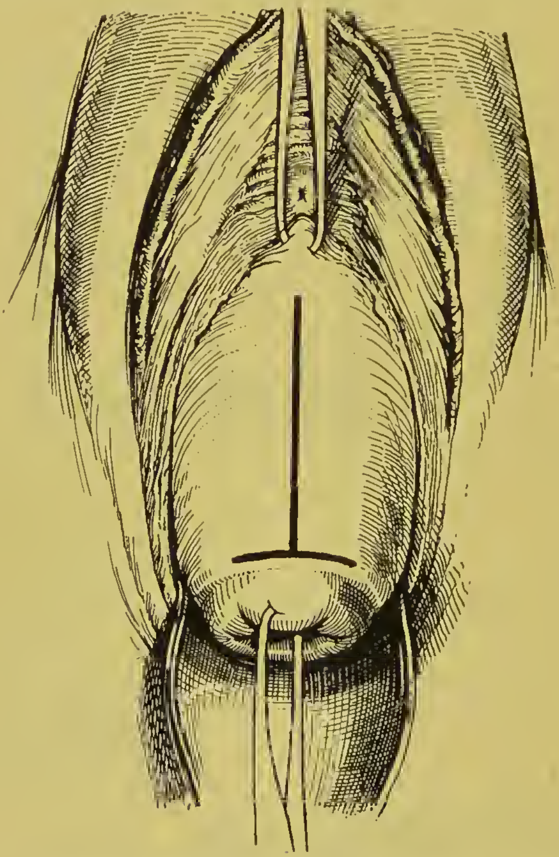


FIG. 116.—Anterior vaginal cœliotomy; first step. Incision of the anterior vaginal wall.

The operator then holds the lower bullet forceps himself in his left hand, and, with the fore and middle finger of his right hand, pushes the bladder gently upwards, at first in the centre and then at the sides. This pushing must always be done with the pulp of the finger pressing upon the cervical tissue, as by so doing there is not the same direct pressure on the bladder and the risk of wounding its wall is minimised.

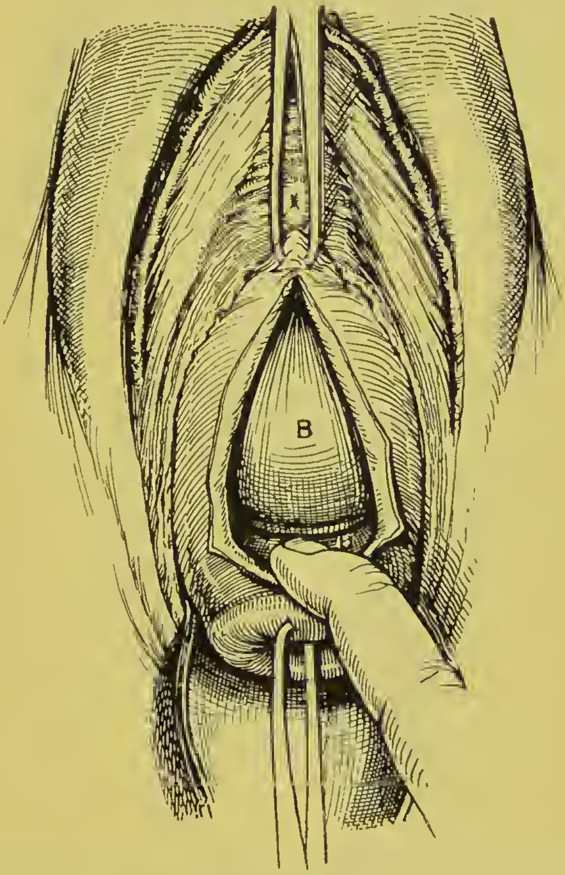


Fig. 117.—Anterior vaginal cœliotomy; second step. The vaginal mucous membrane has been dissected up laterally, and the bladder exposed. B. Bladder. U. Uterus.

As soon as the bladder has been pushed up off the uterus, the next step is to find the line of peritoneal reflection from the anterior wall of the uterus (*v.* Fig. 118). We can usually tell when we have got above this fold by noting the manner in which the tissues at the base of the wound glide freely over the uterine wall, when rubbed by the finger. This gliding is, of course, permitted by the fact that two layers of smooth peritoneum are in contact. It can be simulated by the bladder walls, which will glide over one another in the same manner if the bladder has not been pushed up out of reach. In order to distinguish between the two, it is only necessary to pass a catheter into the bladder; if it is the bladder walls we are rubbing together, the catheter will be felt under our fingers, but, if it is the peritoneal surfaces, the catheter will lie above the fingers in the pushed-up bladder.

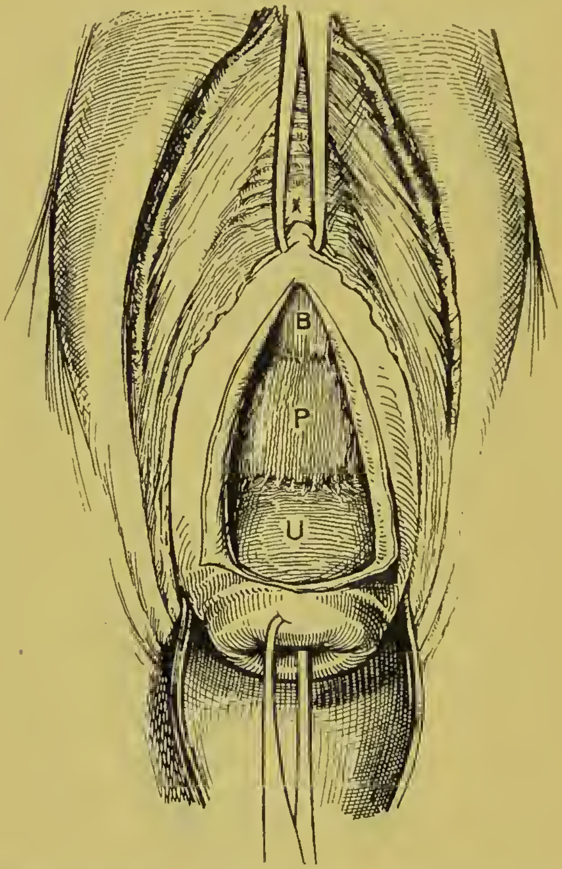


Fig. 118.—Anterior vaginal cœliotomy; third step. The bladder has been pushed upwards, and the vesico-uterine peritoneal reflection exposed. B. Bladder. P. Peritoneum. U. Uterus.

As soon as the peritoneum is recognised, it must be opened. This can be most easily done by catching a fold of it between two clip forceps, and cutting between them with a blunt-pointed scissors. First one and then two fingers are passed through the opening thus made, and the latter increased in size to the required extent.

In the majority of cases, the next step consists in drawing out the fundus of the uterus, as until this is done it will not be possible to readily reach the pelvic contents. To accomplish this the body of the uterus is caught with an American forceps in the middle line, and as high as can be reached, and this point drawn downwards. Another forceps is then applied as high above the former as possible, the forceps upon the cervix is removed, and the cervix itself is pushed upwards and backwards into the posterior fornix. As a rule, by drawing on the second forceps the fundus can be brought out through the opening in the vaginal wall (*v.* Fig. 119), but, if it does not come readily, another forceps must be applied above the first. In some cases, where the uterus is very soft, forceps thus applied will tear out instead of drawing the fundus down. To obviate this accident, which may give rise to troublesome hæmorrhage, sutures of medium-sized silk are inserted trans-

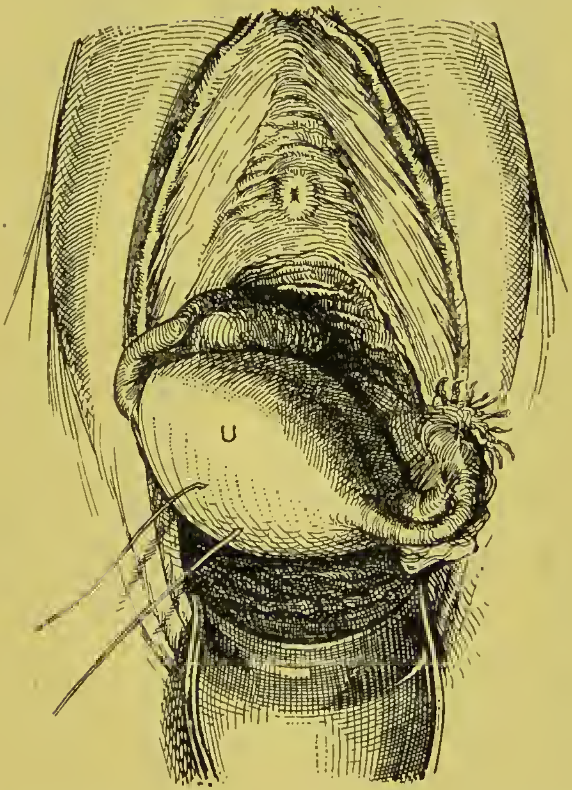


FIG. 119.—Anterior vaginal cœliotomy; fourth step. The fundus has been drawn down through the opening in the peritoneum. The cervix has been allowed to fall back into the vaginal vault. U. Uterus.

versely into the uterine tissue. Each suture goes in deeply enough to obtain a firm hold, and, as in the case of the forceps, they are placed one above another until one of them is sufficiently high to draw the fundus out. The ends of each suture are knotted together, and, as soon as the time has come to push the uterus back again at the end of the operation, they are removed.

As soon as the fundus has been extracted, a general idea of the condition of the pelvis can be obtained by making a bimanual examination with one finger introduced through the opening. The appendages can next be drawn out—taking each side separately—by hooking the fingers behind the tube, and then drawing on the latter until the ovary comes into view. In some cases, by continuing the traction on the tube, the ovary can be drawn right out, but, frequently, if the latter is enlarged, or if its pedicle is short, it will be necessary to catch it in a forceps. A special forceps is made for this purpose, which avoids undue pressure upon the ovary.

As soon as the purpose for which the peritoneal cavity was opened has been carried out, and all the blood, etc., has been removed by means of gauze sponges, the next and final step consists in closing the peritoneal and the vaginal opening. If vaginal fixation of the uterus has been performed, the fixation sutures will also close the opening in the peritoneum (*v.* page 376). If the condition of affairs does not call for fixation, the fundus is pushed back into the peritoneal cavity, a forceps reapplied to the cervix, which is then drawn down, and the peritoneum closed by a continuous catgut suture. Last of all, the vaginal wound is closed, also by a continuous catgut suture, which commences at the urethral end of the wound, and gradually travels to the cervical end. At first, it only includes the vaginal flaps, but as the level of the cervix is reached from which the bladder has been stripped, a portion of the cervical tissue is also included in the stitch. As the end of the wound is reached, care must be taken to suture it so that it will return to its original shape. For this reason, the last few sutures will be passed vertically, and will extend outwards to either side of the vertical incision, in such a manner as to close the transverse incision which was made at the commencement of the operation (*v.* Fig. 120).

Dührssen's method of performing anterior colpotomy differs from the foregoing in that a transverse incision is made through the vaginal mucous membrane, instead of the vertical incision of Mackenrodt. This incision, which is situated at the junction of the anterior fornix and cervix, is made from two to four centimetres in length. Care must be taken, when extending it laterally, that the ureters are not injured. The author prefers Mackenrodt's incision.

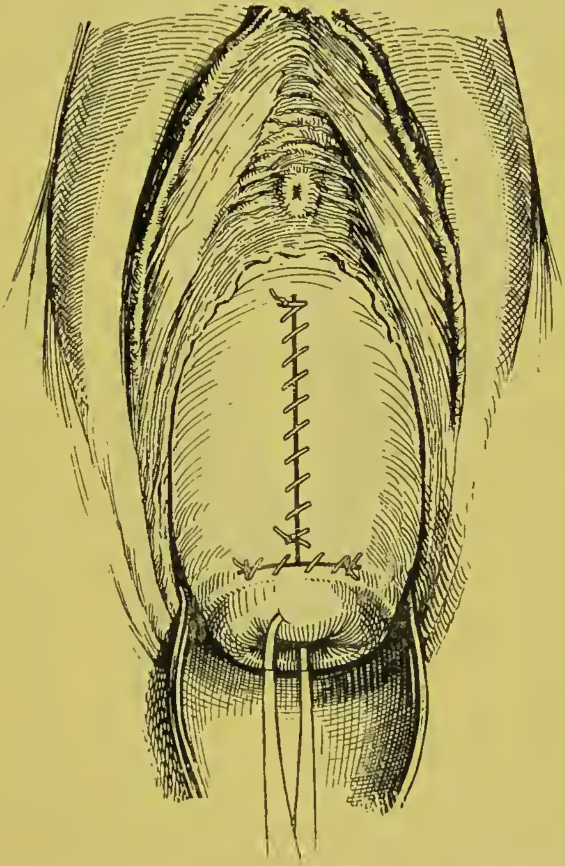


Fig. 120.—Anterior vaginal cœliotomy; final step. The vaginal wound sutured.

Posterior Colpotomy.—A posterior speculum is introduced, and the cervix is seized in a bullet forceps, and drawn downwards and forwards. A transverse incision is then made through the mucous membrane just above the junction of the posterior fornix and the cervix (*v.* Fig. 121). The finger passed into this incision will recognise the peritoneum beneath it by noting the manner in which the latter glides over the uterus, but care must be taken to avoid pushing the peritoneum upwards in front of the fingers. A fold of peritoneum is then caught between two clip-forceps, and a small opening made in it with a blunt-pointed scissors. Two fingers are passed through this opening, and the wound enlarged by gradually dilating it with them until it will admit three or four fingers.

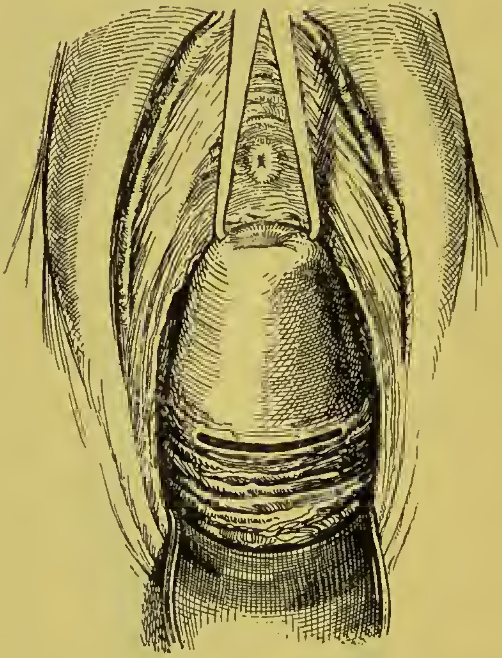


FIG. 121.—Posterior vaginal cœliotomy. The incision.

The pelvis can then be explored by the finger, and the appendages drawn down and examined. The wound is finally closed by means of a catgut suture, which includes both mucous membrane and peritoneum.

Complications.—The most likely complication, so far as the purely operative course of the operation is concerned, is the wounding of the bladder or rectum. The bladder may be wounded during the performance of an anterior colpotomy by the first incision, while separating the bladder from the cervix, or during the removal of a tumour. The method of avoiding the first two has been mentioned, the last can best be guarded against by the use of an anterior retractor or *écarteur* while any cutting operation is going on. The rectum can be similarly wounded in the course of a posterior colpotomy, either during the preliminary incision or when opening into the peritoneal cavity.

After-treatment.—A loose tampon of iodoform gauze is placed in the vagina. The catheter is to be passed every six to eight hours if necessary. The plug may be removed on the evening of the day following the operation, and purgative medicine may be given the same evening. The date at which the patient is allowed up depends on the nature of the operation which has been performed.

CHAPTER XVIII.

OPERATIONS ON THE URETHRA AND BLADDER.

Removal of an Urethral Caruncle—Indications—Instruments—Operation—After-treatment. Excision of Prolapsed Urethra—Indications — Instruments—Operation—After-treatment. Operations for the Cure of Vesico-vaginal Fistula—Instruments—Operations; Marion Sims', Sänger's, Rutherford Morison's, Dudley's, Mackenrodt's, Trendelenburg's — After-treatment. Vesico-cervical and -uterine Fistulæ. Urethral and Ureteral Fistulæ. Artificial Vesico-vaginal Fistula—Indications—Instruments—Operations—After-treatment. Cystoscopy — Indications — Instruments — Operation—After-treatment.

REMOVAL OF URETHRAL CARUNCLE.

THE removal of an urethral caruncle is an extremely simple operation.

Indications.—Removal is indicated in those cases in which an urethral caruncle causes either hæmorrhage or pain.

Instruments.—A sharp-pointed scissors; two small whole-curved needles; needle-holder; toothed dissecting forceps; posterior speculum (*v.* Figs. 104—107, and 115).

Operation.—A **V**-shaped incision is made through the vaginal mucous membrane, in such a manner as to enclose the caruncle between the limbs of the **V**, and the orifice of the urethra (*v.* Fig. 122). The caruncle is then seized in the forceps and dissected out. Finally, the edges of the wound are brought together by fine silk or silkworm-gut sutures passed completely below the raw surface.

After-treatment.—The wound must be kept as clean and dry as possible. The sutures are to be removed on the fourth or fifth day.

EXCISION OF PROLAPSED URETHRA.

The excision of the prolapsed portion of mucous membrane in an urethrocele is also a simple operation.

Indications.—A prolapse of the urethral mucous membrane of such a degree as to cause interference with micturition, pain, and slight hæmorrhage, will require to be excised.

Instruments.—As for urethral caruncle (*v.* page 262).

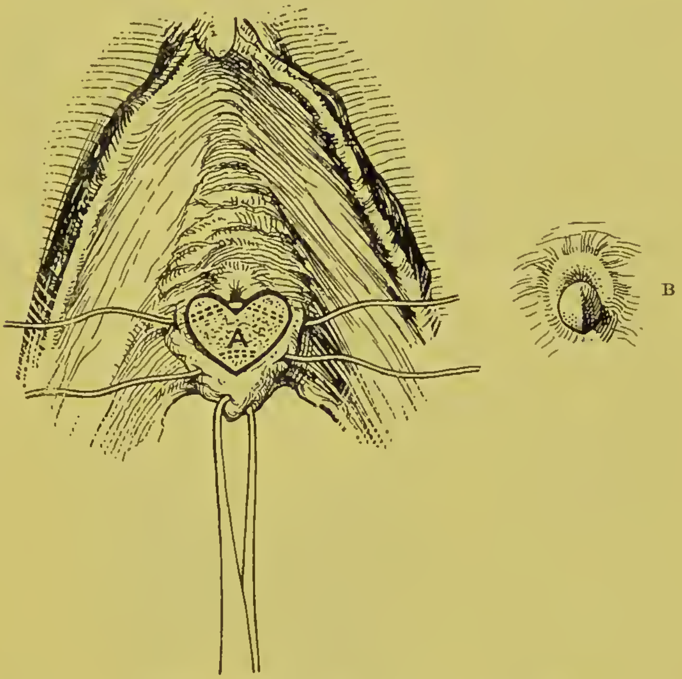


Fig. 122.—Removal of an urethral caruncle. A. The resultant wound with the sutures *in situ*. B. The caruncle before removal.

Operation.—Make an incision round the orifice of the urethra, along the junction of the urethral and vaginal mucous membrane. With the scissors, dissect up the urethra from the subjacent tissue, until the prolapsed portion is isolated. The latter is then cut off with scissors, and finally the urethral mucous membrane is sutured to the edge of the surrounding vaginal mucous membrane with a continuous suture of fine silk or catgut.

After-treatment.—The after-treatment is the same as for urethral caruncle.

OPERATIONS FOR THE CURE OF VESICO-VAGINAL FISTULÆ.

So many operations have been described from time to time for the cure of vesico-vaginal fistulæ, that it is impossible and unnecessary to describe them all. Accordingly, only those which are in common use, or which the author considers to be worthy of attention, will be mentioned.

Instruments.—A posterior speculum; lateral retractors; medium and small whole-curved needles; a needle-holder; small sharp-pointed scissors with rather long handles; scalpels; a couple of American forceps; toothed dissecting forceps (*v.* Figs. 7, 104—107, and 115).

Operation.—There are three operations, any one of which is suitable for small vesico-vaginal fistulæ :

(A) Marion Sims' operation.
(B) Sänger's flap-splitting operation.
(C) Rutherford Morison's operation.

(A) **Marion Sims' Operation.**—Marion Sims' operation is the classical operation which was universally adopted until comparatively recent years. It is still much used for small fistulæ, but the technique has been considerably altered. With the patient in the dorsal position, the fistula is exposed by means of a speculum, and lateral retractors if necessary. It is then drawn downwards as far as possible, by means of an American forceps on the cervix, or on the vaginal mucous membrane just above its upper edge, as suits best. The cicatricial tissue surrounding the fistula is carefully dissected away, if possible in a complete ring, down to, but not including, the bladder mucous membrane (*v.* Fig. 123). Finally, sutures of silkworm gut are passed, half a centimetre apart, and in a direction at right angles to the long axis of the fistula. These sutures are entered about three millimetres ($\frac{1}{8}$ in.) from the edge, and traverse the entire wall with the exception of the bladder mucous membrane. They pass across the fistula to enter the opposite wall just inside the bladder mucous membrane, and emerge at the corresponding point on the vaginal wall to that at which they were entered (*v.* Fig 123, A). When the sutures are tied, any puckering of the vaginal mucous membrane between them is adjusted by means of fine catgut sutures.

(B) **Sanger's Operation.**—An incision is made with a fine scalpel round the fistula at the junction of the vaginal and bladder mucous membranes. This incision is extended transversely at both sides for about a centimetre (*v.* Fig. 124). The vaginal mucous membrane is then dissected off the bladder wall for a distance of about two centimetres above and below

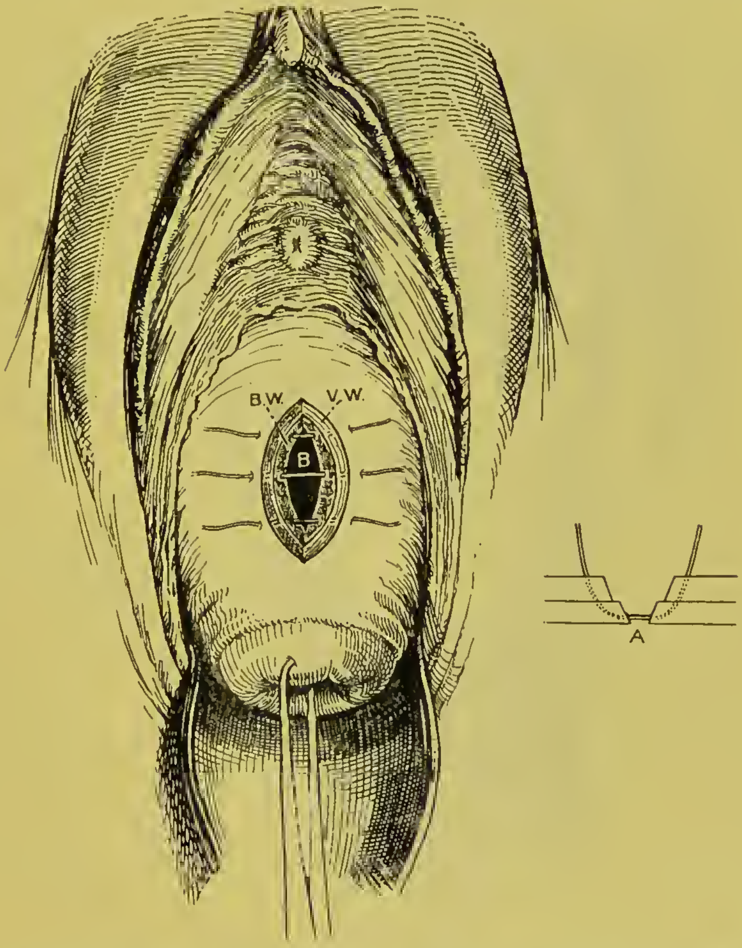


FIG. 123.*—Marion Sims' operation for vesico-vaginal fistula. The method of inserting the sutures. B.W. Bladder wall. V.W. Vaginal wall. A. A suture *in situ.*

---

* In the following diagrams the cervix appears as though drawn outside the vulva by a forceps. This is done in order to expose more fully the anterior vaginal wall; but naturally, in many cases, it will be found to be impossible to draw it down so far during the operation.

the transverse incision, so that two lips—an upper and a lower—are formed from it. The sutures are passed in two layers. The first includes the bladder wall with the exception of the mucous membrane, and is of catgut. The second includes the entire thickness of the vaginal mucous membrane, and is of thin silkworm gut. (*v.* Figs. 124A, 125).

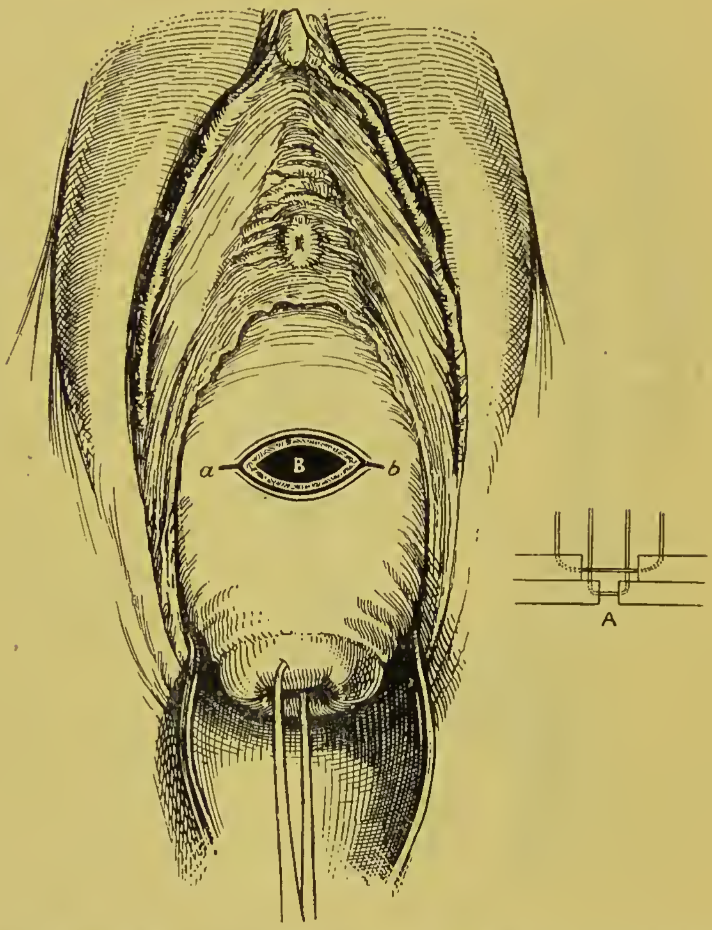


FIG. 124.—Sänger's operation for vesico-vaginal fistula. *a, b.* The incision. B. Cavity of bladder. A. A superficial and a deep suture in position.

(c) **Rutherford Morison's Operation.**—This operation is well suited for small fistulæ. The first step consists in making a horseshoe-shaped incision through the vaginal mucous membrane; so placed, that the open end of the shoe is turned towards the cervix, while the fistula lies at the summit of the convexity (*v.* Fig. 126). The portion of mucous membrane thus marked out is dissected up, until it is only attached to the vagina at the open end of the shoe, and its edges are trimmed round so as to remove the former vaginal orifice of the fistula. Next, the edges of the fistula in the bladder wall are pared, and the opening closed by catgut sutures as in Sänger's operation (*v.* Fig. 127). Finally, the vaginal flap is sutured in its former position with silkworm-gut sutures (*v.* Fig. 128). By this means, the opening in the bladder wall is covered by an unbroken layer of the vaginal mucous membrane.

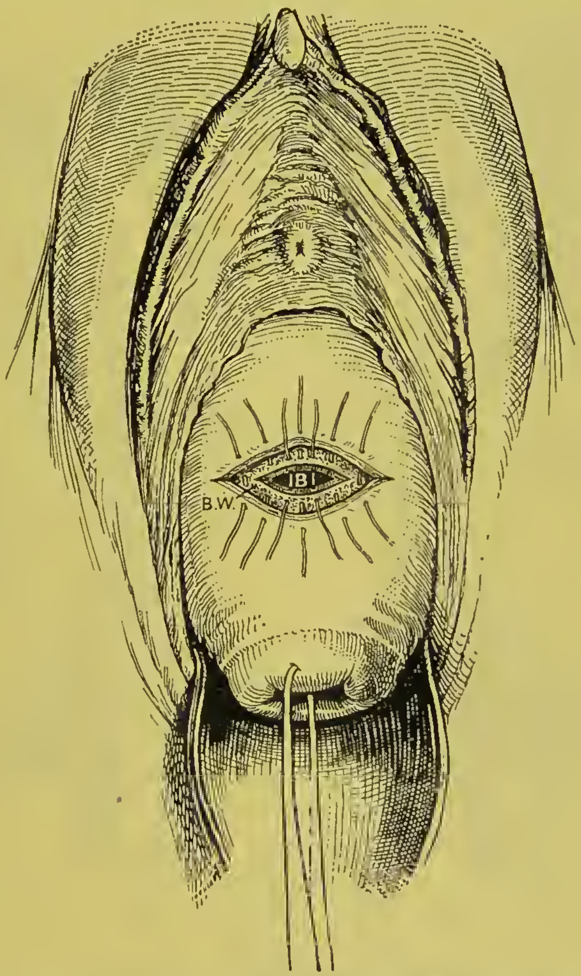


Fig. 125.—Sänger's operation for vesico-vaginal fistula. The vaginal mucous membrane has been reflected up and down, and the sutures inserted. B.W. Bladder wall. B. Cavity of bladder.

The radical cure of large vesico-vaginal fistulæ is usually a matter of very great difficulty, owing to the cicatricial contraction and distortion of the parts by which they are usually accompanied. To give an instance of the difficulties of operation, it may be mentioned that Dudley succeeded in curing a patient after a series of nineteen operations spread over a period of five years.

For large vesico-vaginal fistulæ, two operations have been designed and successfully carried out :—

Fig. 126.

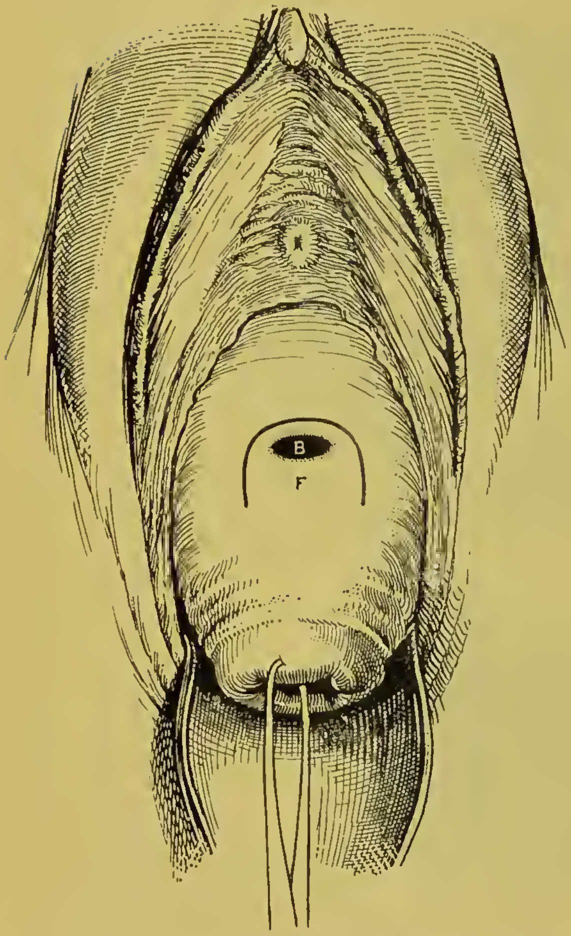


Fig. 127.

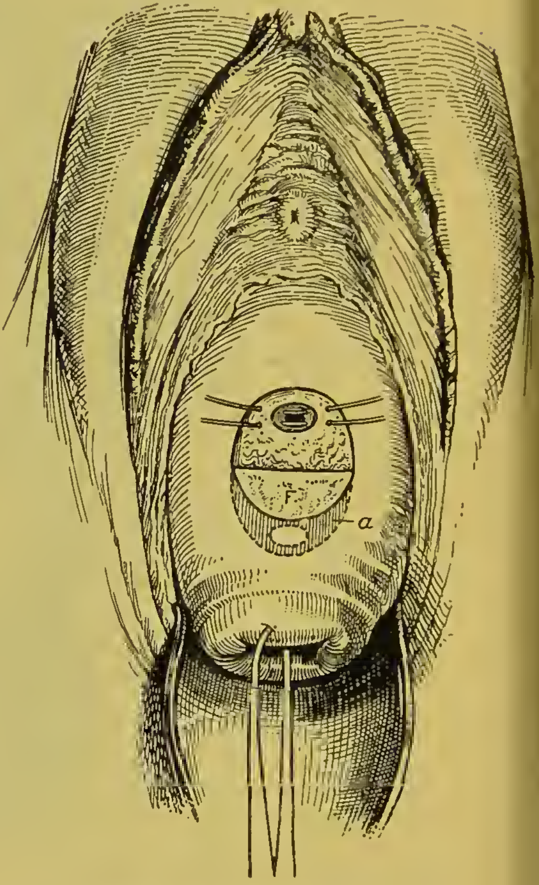


Fig. 126.—Rutherford Morison's operation for vesico-vaginal fistula. The incision. B. The fistula. F. The flap.

Fig. 127.—Rutherford Morison's operation for vesico-vaginal fistula. The horseshoe-shaped flap of mucous membrane has been reflected downwards. The sutures in the bladder wall are shown. F. The shortened flap. *a*. The portion to be removed.

(A) Dudley's operation.
(B) Mackenrodt's operation.

(A) **Dudley's Operation.**—Dudley's operation consists in denuding the edge of the lower half of the fistula, and then connecting the ends of this denuded edge by a strip, from which the mucous membrane has also been removed, running across the fundus of the bladder. This strip is about a centimetre in width, and lies at a distance of an inch from the superior or undenuded edge of the fistula (*v.* Fig. 129). By means of interrupted silkworm-gut sutures, the denuded edge

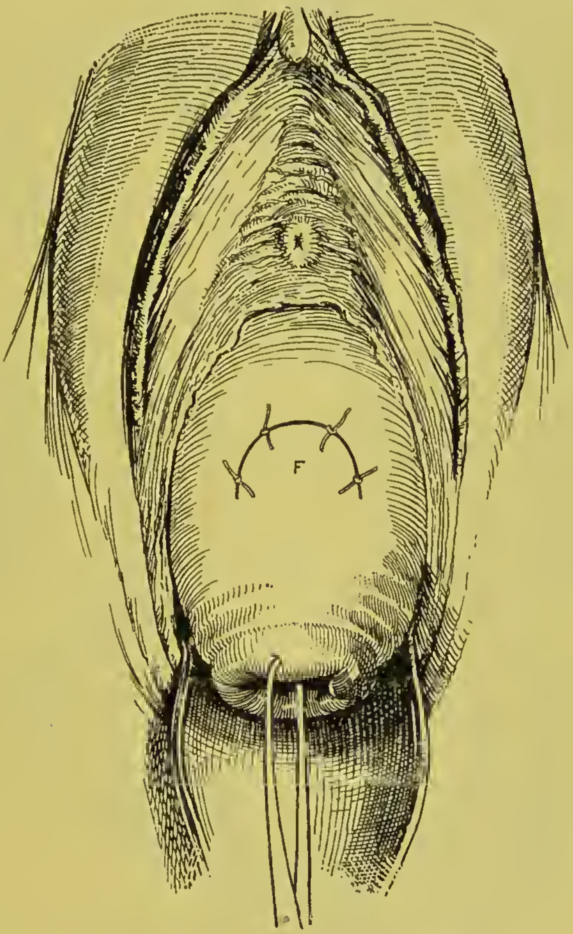


Fig. 128.—Rutherford Morison's operation for vesico-vaginal fistula. The flap has been drawn back into position and the sutures inserted.

is then sutured to this strip. The result is that the portion of bladder wall which lay between the strip and the undenuded edge of the fistula is turned outwards into the vagina and forms a portion of the vesico-vaginal septum, while the bladder itself is correspondingly reduced in size (*v.* Fig. 130).

(B) **Mackenrodt's Operation.**—Mackenrodt's operation is briefly as follows :—An incision is made down to the bladder wall in the middle line of the anterior vaginal wall. It crosses the fistula, and extends from a little below the cervico-vaginal junction to a little above the orifice of the urethra (*v.* Fig. 131). The edges of the fistula are then split, and with the handle of the scalpel the vaginal wall is separated from the bladder all round (*v.* Fig. 132). This separation extends up

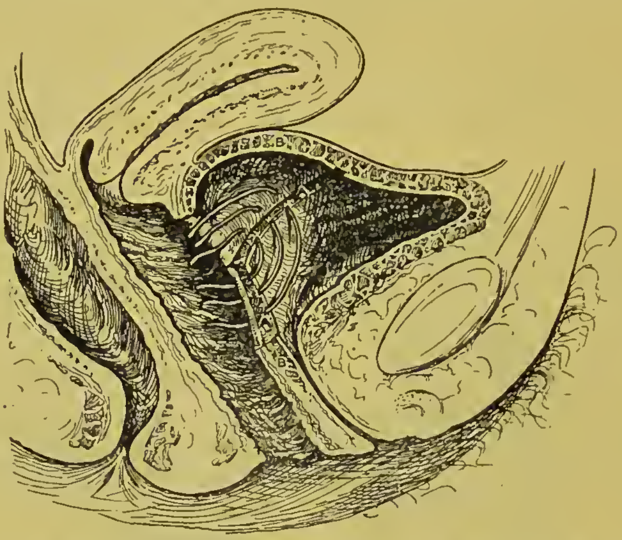


Fig. 129.—Dudley's operation for vesico-vaginal fistula. Showing the denudation of the lower half of the edge of the fistula, and of a strip running across the fundus of the bladder. The sutures are also shown *in situ*.

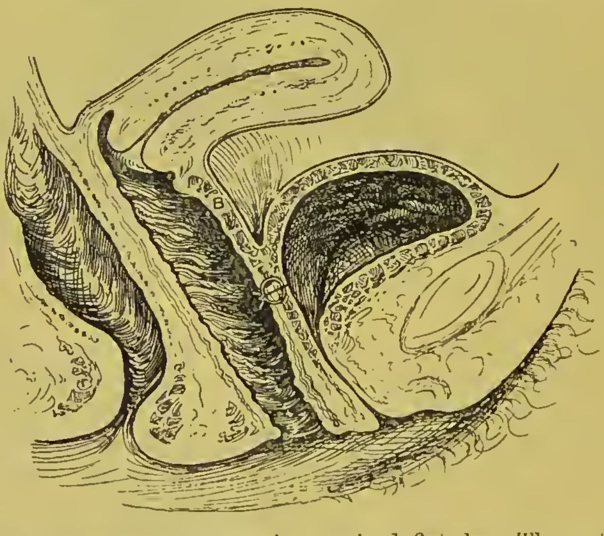


Fig. 130.—Dudley's operation for vesico-vaginal fistula. The sutures are tied. Note the diminution in size of the bladder and the manner in which a portion of the bladder wall is turned outwards into the vagina.

to the vesico-uterine peritoneum (*v.* Fig. 134). The bladder walls thus set free are pulled together and sutured, after first removing the scar-tissue round the edges of the opening. Finally, the vaginal wound is closed by drawing its edges together with sutures, or, if that is impossible owing

Fig. 131.

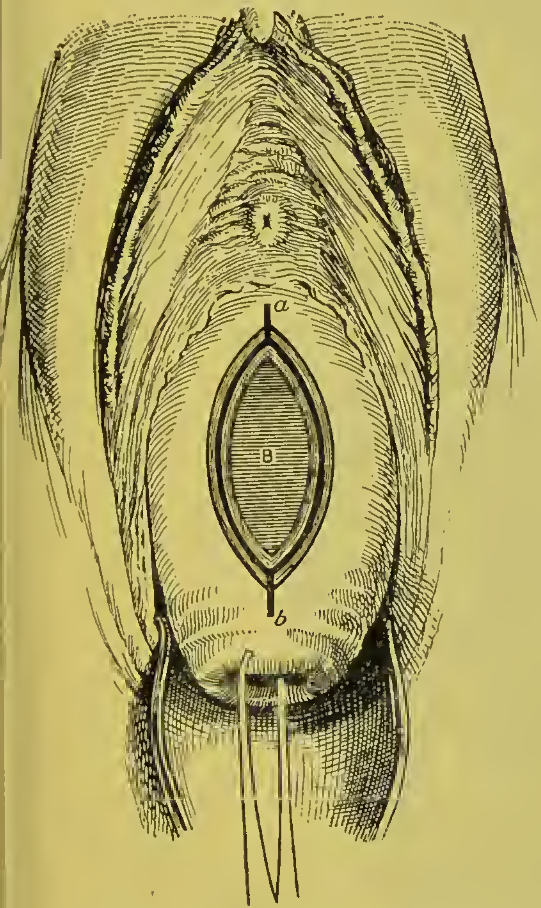


Fig. 132.

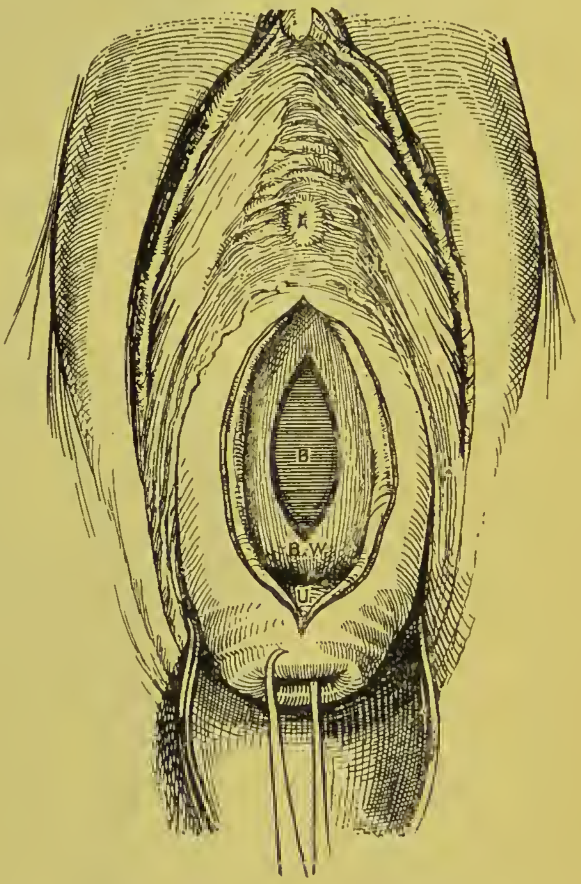


Fig. 131.—Mackenrodt's operation for vesico-vaginal fistula. *a, b.* The incision. B. The bladder.

Fig. 132.—Mackenrodt's operation for vesico-vaginal fistula. The vaginal walls have been separated in all directions (compare with Fig. 133). B.W. Bladder wall. U. Cervix.

to the loss of tissue, by suturing the body of the uterus into the opening.

Trendelenburg's Operation.—In cases in which the fistula cannot be brought down sufficiently close to the vulva to afford access to it, owing to the amount of cicatricial tissue, Trendelenburg recommends the following operation:—An opening is made

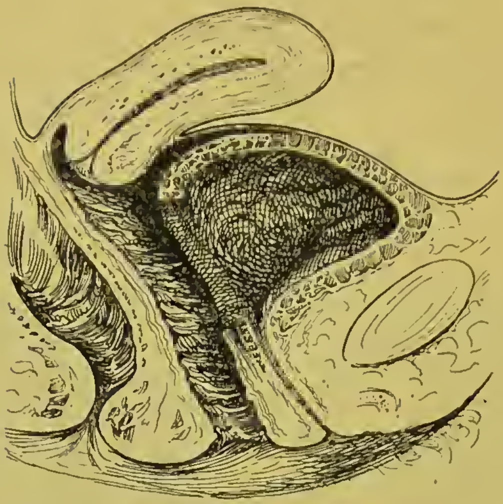


Fig. 133.—Mackenrodt's operation for vesico-vaginal fistula. This represents in sagittal section the same stages of the operation as Fig. 132.

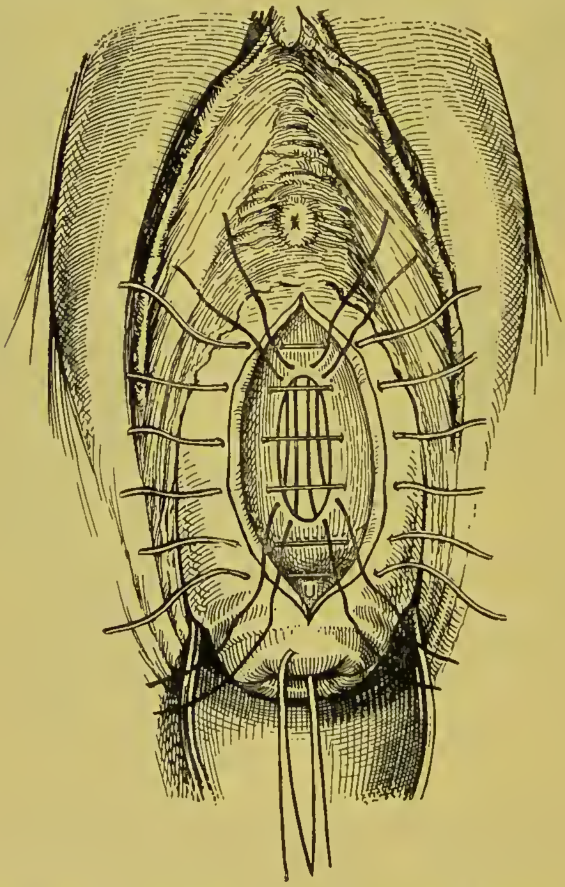


Fig. 134.—Mackenrodt's operation for vesico-vaginal fistula. The sutures *in situ*. The black sutures are in the bladder wall, the white are drawing together the vaginal flaps. (Compare with Fig. 135.)

supra-pubically into the bladder through a transverse incision slightly above the symphysis. The vesical aspect of the fistula is thus exposed, the edges are pared, and the necessary sutures are passed by means of two needles, so that the ends project into the vagina. These sutures are then tied from the vagina, and the openings in the anterior bladder wall and in the abdominal wall are closed. It may be advisable to leave a drainage-tube in the supra-pubic opening for a few days, and to oblige the patient to lie in a semi-prone position so that the urine may escape freely and not come into contact with the vaginal fistula.

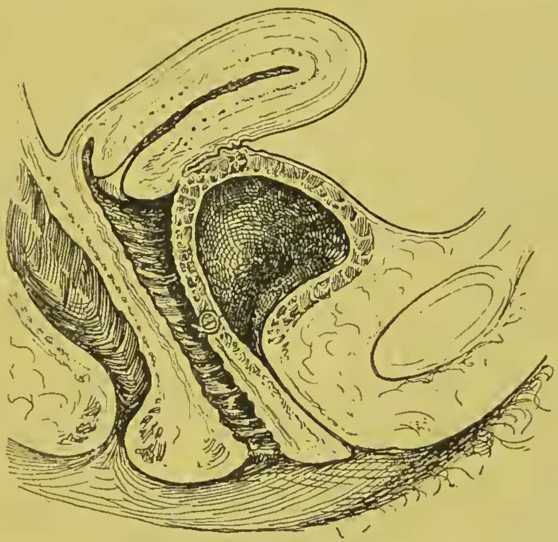


Fig. 135.—Mackenrodt's operation for vesico-vaginal fistula. This represents in sagittal section the same stage of the operation as Fig. 134.

After-treatment.—The vagina is lightly plugged with iodoform gauze, which is removed the next day. A catheter must be passed every three hours for the first three or four days, but it is not advisable to leave one in permanently on account of the danger of cystitis. The sutures are removed on the tenth day.

VESICO-CERVICAL AND VESICO-UTERINE FISTULÆ.

Vesico-cervical and -uterine fistulæ can be operated on either through the vagina, or through a supra-pubic opening. In the former case, the bladder is separated from the uterus, and the operation resembles Mackenrodt's operation for vesico-vaginal fistulæ which has been just described. In the latter case, the operation is similar to that for vesico-vaginal fistulæ described by Trendelenburg.

In some cases, these fistulæ have been operated on through the usual mesial incision made in abdominal cœliotomy, the fistula being reached by opening the peritoneum at the base of the vesico-uterine *cul-de-sac* (Bardenheuer and Dittel).

URETHRAL AND URETERAL FISTULÆ.

Urethral and ureteral fistulæ require for their cure so very many different forms of operations, according to the nature of each individual case, that it would not be possible to enter into them in a book of this size. The reader is accordingly referred to the large text-books for the necessary information.

ARTIFICIAL VESICO-VAGINAL FISTULA.

Artificial vesico-vaginal fistula is the term applied to the operation for making a communication between the bladder and the vagina.

Indication.—The only condition which calls for such an operation is severe chronic cystitis, which cannot be cured by any other line of treatment.

Instruments.—A metal catheter; scalpel; toothed forceps; small curved needles; needle-holder; and a posterior speculum (*v.* Figs. 104—107, and 115).

Operation.—A posterior speculum is introduced into the vagina and the anterior vaginal wall exposed. A metal catheter is passed into the bladder, and pushed against the posterior bladder wall in such a manner as to cause a prominence on the anterior vaginal wall in the middle line. By cutting on to the tip of the catheter, an opening of about three-quarters of an inch in length is made into the bladder. Three or four sutures are then passed through both vaginal and bladder wall just inside the cut edges of the opening, in such a manner that when tied they will bring the vaginal and bladder mucous membrane into contact. By this means, the subsequent closing of the opening is prevented.

After-treatment.—A light plug of gauze is placed in the vagina, one end of which projects slightly through the opening. This plug must be removed in four or five hours, on account of urinary decomposition. The sutures may be removed in a week.

CYSTOSCOPY.

Cystoscopy (*κύστις*, the bladder; *σκόπεω*, I see) is the term applied to the visual examination of the badder.

Indications.—The exploration of the bladder with the finger, or the direct examination of its walls by means of a cystoscope, is indicated under the following circumstances:—

(1) In cases of persistent chronic cystitis, which resists treatment, with the object of ascertaining if there is any removable cause for the condition.

(2) In cases of suspected disease of one kidney, with the object of establishing a diagnosis, and of determining which kidney is diseased.

Instruments.—The following instruments and apparatus are required (Kelly):—

(1) A set of graduated metal dilators made on the principle of Hegar's dilators, and ranging from No. 5 to No. 14 (*v.* Fig. 136). The numbers correspond to the diameter of the instrument in millimetres. A single conical urethral calibrator or dilator (Kelly) may be used instead (*v.* Fig. 137).

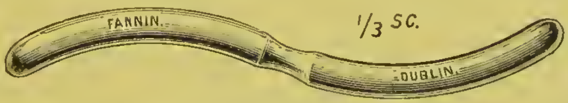


FIG. 136.—Kelly's urethral dilator.

(2) A set of vesical specula also ranging in size from No. 5 to No. 14 (*v.* Fig. 137).

(3) A long mouse-toothed forceps, an applicator, an ureteral searcher (*v.* Figs. 137, 138), and an evacuator for keeping the bladder empty.

(4) Some form of illuminant, which must be fairly strong and portable. If the necessary current can

be obtained, a sixteen candle-power incandescent lamp is most suitable.

(5) A laryngeal mirror, with a head band.

Operation.—The most satisfactory and the most easily worked form of cystoscope is that used by Kelly, as described above.

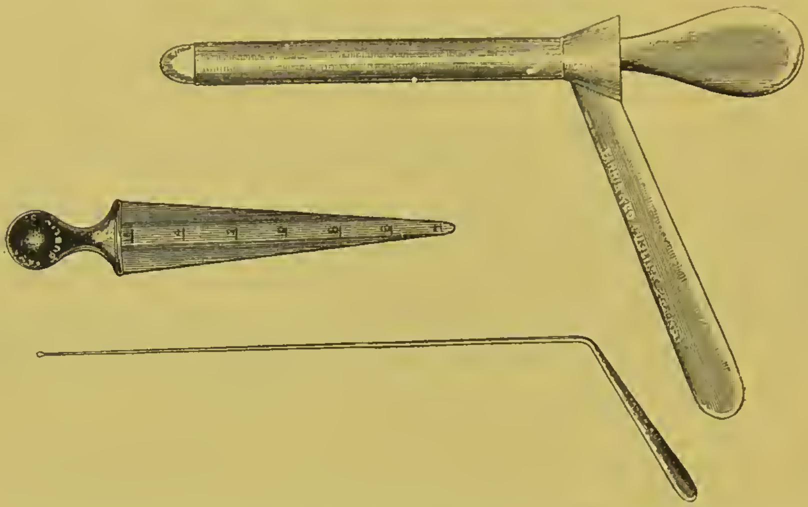


FIG. 137.—Kelly's vesical speculum, conical urethral calibrator, and ureteral searcher.

In order to get good results with it, three points must be attended to:—

(1) There must be a good illuminant, capable of being so adjusted that its rays can be thrown through the speculum into the bladder.

(2) The bladder must be distended to the full, or very nearly to the full, by atmospheric pressure.

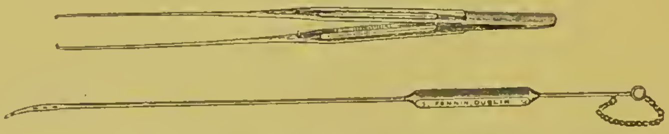


FIG. 138.—Kelly's mouse-toothed forceps for use through the speculum, and an ureteral catheter.

(3) The bladder must be kept free from urine.

As has been said, a sixteen candle-power incandescent lamp furnishes the most suitable light. The necessary ballooning of the bladder can be obtained by placing the patient in such a position that the intestines gravitate toward the diaphragm, so causing a diminution in the intra-abdominal pressure. For this purpose there are two suitable positions, the knee-breast position, and the elevated dorsal position. The latter is the least tiring for the patient, and is also the position in which an anæsthetic can be most easily given. It is not, however, of much value in stout patients with strong abdominal walls, as it does not furnish a sufficient difference in level to make the intestines fall well down towards the diaphragm. For such cases the knee-chest position is the more suitable. If an anæsthetic is given, "the best way to hold the patient in the knee-breast position is for two assistants to stand, one at each side, close up to the body to prevent it from falling sideways, each grasping the body with one arm thrown over the back, and holding the leg in the crotch of the knee with the other hand to keep it (the leg) from slipping up or down" (Kelly). The urine which collects in the bladder can be removed from time to time by the use of the evacuator, or by means of pledgets of cotton wool introduced by means of the long-toothed forceps.

To examine the bladder, the patient is placed in whichever position is considered most suitable, and under an anæsthetic if possible. The urethra is then dilated by introducing successive sizes of the urethral dilators, or by gently introducing the conical dilator until the necessary size is obtained. As a rule up to No. 12 or 14 will be quite sufficient, and if the dilatation is carried beyond this there is a danger of causing permanent paresis of the sphincter vesicæ. The speculum corresponding in size to the dilator which has been last used is then introduced, and as soon as the obturator which fills its orifice is removed, air rushes in and the bladder expands. By means of the laryngeal mirror—fixed on the forehead of the examiner—the rays, of whatever source of illumination is used, are thrown down the speculum, and the portion of bladder wall immediately opposite the mouth of the latter is examined. By moving the speculum about, the entire interior of the bladder can be thus seen. The orifice of the ureters are seen as fine transverse lines about two millimetres long, situated on the side of a little pinkish prominence—the *mons ureteris*—which marks the site at which each ureter opens into the bladder (Kelly).

If, as frequently happens, a slight laceration of the urethral orifice occurs during examination, it must be closed by a couple of fine silk or catgut sutures.

After-treatment.—No special after-treatment is necessary. The patient should remain quietly in bed for a day or two. There may be slight urinary incontinence lasting for twenty-four or forty-eight hours, but it will soon pass off if too great a degree of dilatation has not been carried out. If any sutures have been introduced, they may be removed on the fifth day.

CHAPTER XIX.

OPERATIONS ON THE VULVA, PERINÆUM, AND VAGINA.

Operations on the Vulva: Amputation of the Clitoris—Indications—Instruments — Operation — After-treatment: Removal of Bartholin's Gland—Indications—Instruments—Operation: Solid Tumours of the Labium: Imperforate hymen—Operation. Operations on the Perinæum and Vagina: Perinæorrhaphy and Colpo-perinæorrhaphy—Indications—Instruments—Operations; Incomplete Perinæorrhaphy and Colpo-perinæorrhaphy; Lawson Tait's, Kelly's, Martin's, Hegar's—Complete Perinæorrhaphy and Colpo-perinæorrhaphy; Lawson Tait's, Hegar's — Complications — After-treatment — Operations — Complications — After-treatment: Anterior Colporrhaphy—Indications—Instruments—Operation— Complications—After-treatment: Colpocleisis — Indications — Operation: Removal of Vaginal Cysts: Atresia of the Vagina—Operation.

OPERATIONS ON THE VULVA.

Amputation of the Clitoris.—Amputation of the clitoris is indicated in :—

(1) Malignant disease—carcinoma.

(2) Elephantiasis.

Instruments.—A scalpel; half a dozen clip forceps; a toothed dissecting forceps; scissors with sharp points; small and medium whole-curve needles; and a needle-holder (*v.* Figs. 106, 107, 115).

Operation.—The diseased area is marked out by means of an incision through the skin. If the case is one of malignant disease, as much of the surrounding tissue as possible, compatible with the subsequent bringing together of the skin edges, is removed. The growth is then seized in the forceps, pulled outwards, and detached from its base either by tearing through the soft tissue with the handle of the scalpel, or by dividing it with the scissors. Any large vessels which are cut must be tied or twisted in an artery forceps; as a rule, however, all bleeding will cease as soon as the sutures are tied. These are passed from left to right beneath the cut surface, and when tied should bring the skin edges into apposition. If they do not do so, intermediate superficial sutures are inserted as well. Silkworm gut is the best material for all sutures. If, owing to the very extensive nature of the growth, it is found to be impossible to bring the edges together, it may be necessary to leave the wound to granulate. In such a case, if there is excessive oozing from the raw surface, it may be checked by touching the surface gently with a Paquelin's cautery at a dull red heat. In this operation and in similar operations, the amount of hæmorrhage may be very much lessened by injecting subcutaneously in several places round the growth, and prior to the operation, a couple of minims of a one in 3000 solution of adrenalin. Also during the operation the solution may be again applied to the cut surfaces with a little sponge of cotton wool.

After-treatment.—The wound is powdered with boracic acid, or other antiseptic, and is kept clean and dry. The sutures may be removed on the eighth day.

REMOVAL OF BARTHOLIN'S GLAND.—Removal of Bartholin's gland is required :—

(1) If it becomes cystic.
(2) If an abscess forms in it which is not cured by incision and drainage.

Instruments.—The instruments required are the same as those used for amputation of the clitoris (*v.* page 279).

Operation.—An incision is made through the skin over the most prominent part of the cyst, and parallel to the labium. With the handle of the scalpel the cyst is then detached from the surrounding tissue, if possible without rupturing it. As soon as it has been freed all round its margins, it can be drawn outwards by seizing it in the fingers or in the dissecting forceps. Its attachments at the base are thus exposed, and form a kind of pedicle. This pedicle is ligated and divided, and the cyst removed. The cavity left by its removal is closed—if not too large—by silkworm-gut sutures, passed transversely, and going completely below its base. If it is of considerable size, it must be closed by successive layers of buried catgut sutures.

If we have to deal with an abscess and not with a cyst, it is sometimes best to scrape out the gland with a sharp curette, instead of dissecting it out, and then to plug the resultant cavity with iodoform gauze. This gauze is removed and fresh gauze introduced daily, or every second day, until the cavity is obliterated. If sutures are used, they may be removed on the eighth day.

Solid Tumours of the Labium.—Solid tumours of the labium, if pedunculated, are very easily removed. Sessile tumours must be excised in whatever way will leave the least deformity, and enable the edges of the skin to be brought together by sutures so as to completely cover the wound surface.

Imperforate Hymen.—The operation for the relief and cure of an imperforate hymen is of extreme simplicity. It is however not always free from danger, on account of the liability of the retained menstrual products to decompose when air gains access to them.

Operation.—As a rule, the operation must be done in two stages. The first stage consists in making a small opening with a scalpel through the obstructing membrane sufficiently large for the fluid to be able to escape. This opening is carefully covered with a large pad of antiseptic cotton wool, in order that all discharge may be absorbed as it comes away. The cotton wool is changed, and the patient carefully washed, every few hours. As soon as all the discharge has escaped, the opening in the hymen is enlarged by making a crucial incision in it; and the vagina and uterus—if the latter has shared in the dilatation—are douched out thoroughly, and plugged with iodoform gauze. This plug is removed in twenty-four hours.

OPERATIONS ON THE PERINÆUM AND VAGINA.

Perinæorrhaphy and Colpo-perinæorrhaphy.—By the term perinæorrhaphy (*περίναιον*, the surrounding district; *ῥαφή*, a seam) is meant the suturing of a ruptured perinæum with the object of restoring it to its original condition.

By the term colpo-perinæorrhaphy (κόλπος, the vagina; περίναιον; ῥαφή, a seam) is meant the narrowing of the vagina by the removal of a portion of the mucous membrane of the posterior vaginal wall, and at the same time the re-forming of the perinæum.

Indications.—Immediate perinæorrhaphy is indicated in all cases in which the so-called inevitable laceration of labour, involving the posterior fourchette, passes that limit and invades the perinæum proper.

Perinæorrhaphy for chronic laceration is indicated under the following conditions:—

(1) If the laceration extends into the rectum, that is if it is "complete."

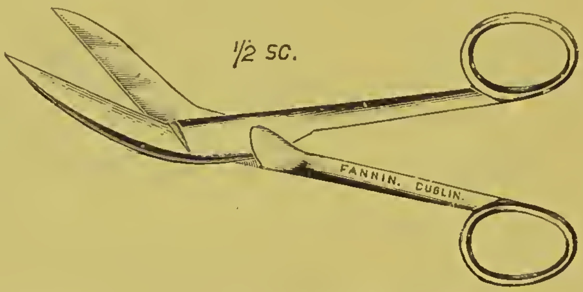


Fig. 139.—Lawson Tait's perinæorrhaphy scissors.

(2) If the laceration tends to cause extreme gaping of the vulva, or to favour prolapse of the vaginal walls or uterus.

(3) If the laceration prevents the retention of a suitably sized pessary, in cases where such must be worn.

The main indication for colpo-perinæorrhaphy is the existence of a lacerated perinæum accompanied by a degree of rectocele that cannot be remedied by wearing a suitable pessary.

Instruments.—A pair of sharp-pointed scissors with the blades inclined laterally at an angle of a right angle and a half to the handles (*v.* Fig. 139); three or four pairs of American forceps; two or three clip-forceps; large and medium whole-curved needles; a needle-holder; silkworm-gut and catgut sutures; and a toothed forceps (*v.* Figs. 7, 106, 107, 115).

Operations.—The operations for the repair of the perinæum, either with or without an accompanying rectocele, fall into two groups according as the perinæal laceration is incomplete or complete.

I. Incomplete perinæorrhaphy and colpo-perinæorrhaphy.
II. Complete perinæorrhaphy and colpo-perinæorrhaphy.

I. Incomplete Perinæorrhaphy and Colpo-perinæorrhaphy.—Under this heading we shall describe one operation for the cure of perinæal laceration alone, and three operations for the repair of perinæal laceration accompanied by a rectocele.

(A) **Lawson Tait's Incomplete Perinæorrhaphy.**—The characteristic feature of this method of repairing perinæal lacerations is that no tissue is removed. It is performed as follows:—

Separate the labia and look for the outlines of the laceration. These outlines, which show the extent of repair necessary, will as a rule be found to enclose a crescentic area of cicatricial tissue, whose horns point forwards and end in the lateral portions of the remains of the hymen at the junction of skin and mucous membrane (*v.* Fig. 140, A, B, C′). At each of the points A and B the skin is seized in an American forceps, so marking out the anterior limits of the new perinæum. A third forceps is applied to the perinæal skin in the middle line just behind the posterior limits of the tear. The two anterior forceps are held by an assistant in such a manner as to separate the parts, the third is allowed to hang down, and by its weight keeps the skin tense. The point of the scissors is now passed firmly through the skin just in front of the posterior forceps, *i. e.* at the junction of what was once the raw surface of the laceration and the perinæal skin, and pushed upwards through the subjacent tissues for about half an inch, keeping parallel to the rectum. The points of the scissors are then turned outwards in the direction of the forceps on the operator's right side, and pushed on until they are just behind that forceps. Then, by closing the scissors the parts are divided at a single cut up to the forceps, care being taken that the skin is incised exactly along the lower margin of the crescentic area mentioned above (Fig. 140, C, B). The scissors are then turned to the opposite side, and a similar incision made there (Fig. 140, C, A). If the case is one suitable for Lawson Tait's operation, *i. e.* if there is no great tendency to the formation of a rectocele but rather a lack of mucous membrane, the vaginal wall will retract upwards and a raw surface be left which more or less corresponds with the original outlines of the laceration (*v.* Fig. 141, A, C′, B, C). The lower portion of the vaginal mucous membrane is then caught at C′ in a forceps and drawn gently forwards, in such a manner that, when the sutures are inserted and tied, it will be situated at the anterior edge of the new perinæum. If the incisions were not made of sufficient depth in the first instance to permit this to be done, their depth may be increased with the scissors.

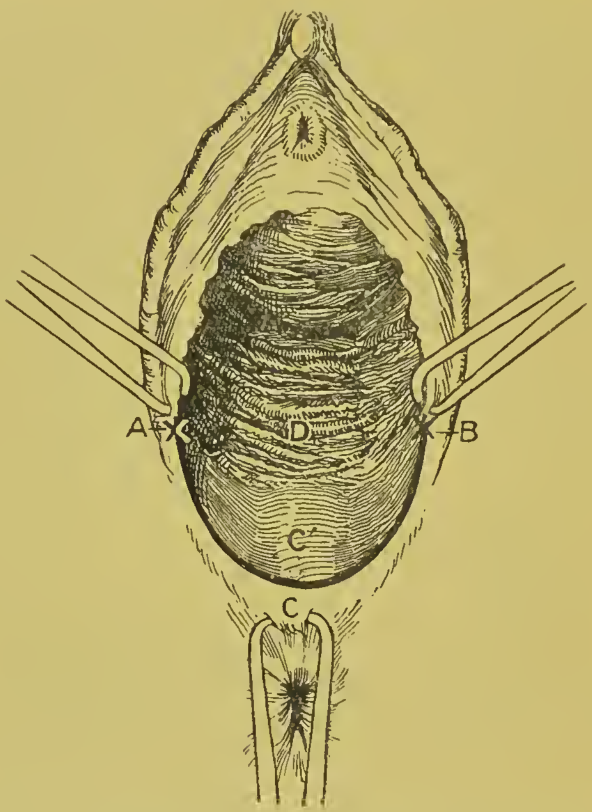


FIG. 140.—Lawson Tait's incomplete perinæorrhaphy. The area A, B, C′ represents the crescentic area of the original laceration. D. The normal vaginal mucous membrane. The heavy line marks the incision.

The next step consists in the insertion of the sutures. They are passed from side to side, commencing with the most posterior, and in such a manner that, while they take a firm hold of the lateral portions of the raw surface, they only include a small portion of the base. The most posterior suture is first passed with a medium needle. It enters the skin slightly to one side of the middle line, passes into the thickness of the external sphincter, if the laceration involves the latter, and emerges at the corresponding point at the opposite side. The next suture is inserted half an inch further forwards, passes deeply into the

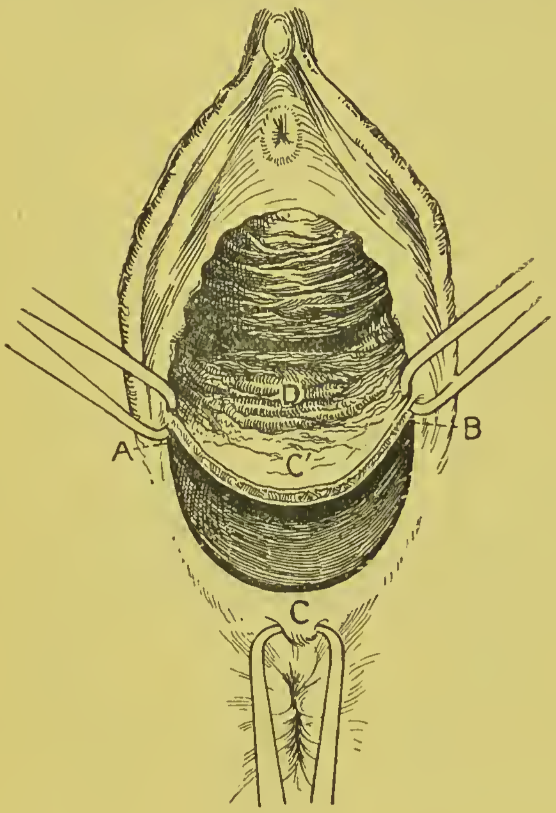


Fig. 141.—Lawson Tait's incomplete perinæorrhaphy. The result of the incision. The posterior vaginal wall has retracted upwards leaving a crescentic denuded area, A, C′, B, C, almost similar in size and shape to the cicatricial area, A, B, C′.

lateral portion of the wound, includes a little of the base, again passes deeply into the opposite lateral surface, and so out. The third, which is usually the last suture, is inserted another half inch further forwards, takes a firm hold of the sides, and travels lightly through the flap in such a manner as to keep it in the desired position. By this means, no raw surface is left and the wound heals rapidly. The accompanying drawings show better than words the manner in which the sutures are passed (*v.* Fig. 142).

This method of dealing with the vaginal flap is not identical with the method described by Lawson Tait. He does not draw the flap forwards, as recommended above, but rather allows it to remain in the position into which it retracts of its own accord. The sutures are entered just within the skin edge and do not include the flap (*v.* Fig. 143, A). It seems as if this method would result in the formation of a long skin perinæum, above which there would be a regular pocket, while the other mode of suturing by drawing the flap forwards restores the original outline of the posterior vaginal wall.

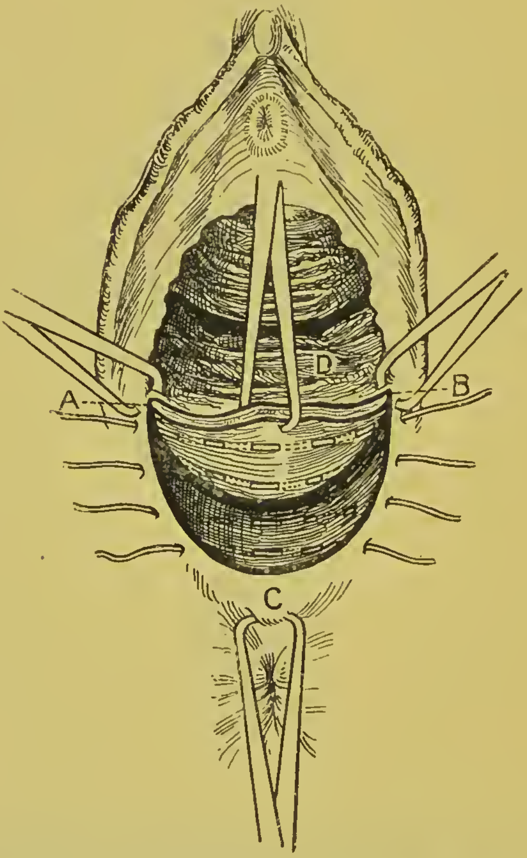


FIG. 142.—Lawson Tait's incomplete perinæorrhaphy. The posterior vaginal wall is drawn forwards by a forceps, and the sutures are *in situ.*

If there is much redundant skin, but yet not sufficient to warrant the performance of a colpo-perinæorrhaphy, the following slight difference is made in our procedure. After the incision has been made, as described above, the depth of the wound is increased by pushing upwards with the finger in the recto-vaginal fossa in such a manner as to peel the vaginal flap of the rectum. The vaginal flap is then drawn downwards, and as much of it as is considered necessary is cut off. In doing this, care must be taken not to remove more than will allow the anterior edge of the flap to be subsequently drawn forwards to form the anterior edge of the perinæum, and to preserve its original outline.

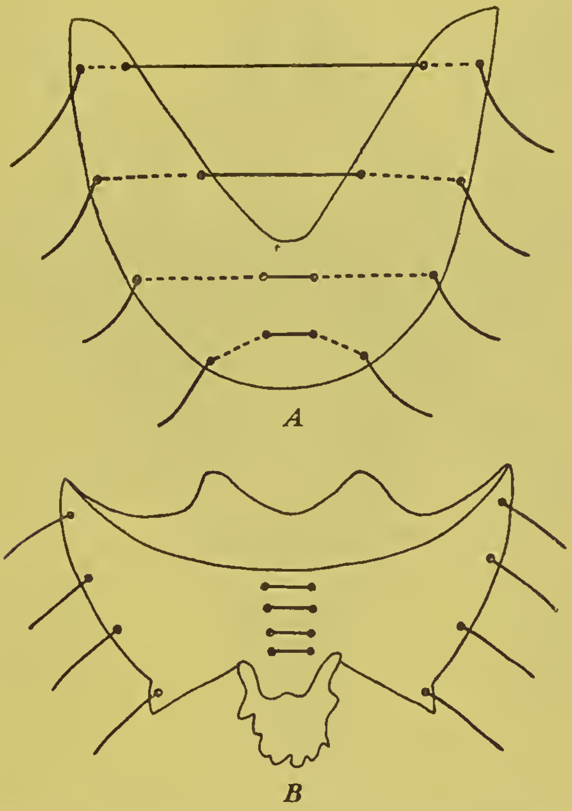


Fig. 143.—A. Lawson Tait's method of inserting the sutures in incomplete perinæorrhaphy. B. Lawson Tait's method of inserting the sutures in complete perinæorrhaphy (McKay).

(B) **Martin's Colpo-perinæorrhaphy.**—The general plan of Martin's operation is somewhat similar to that of Kelly's, and will be seen by referring to the diagram (*v.* Fig. 144). The denuded area consists of an oval portion B, H of the same size, and in the same position, as the original area of perinæal laceration, and of two triangles A, B, C, and D, E, F situated one at either side of the median *raphe* of the posterior vaginal wall. Their apices A and D are situated as high on the vaginal wall as can be easily reached. The vaginal wall is seized by a forceps in the middle line, just above the points intended for the apices of the two triangles. A second and a third bullet forceps are applied at the points B and H—the anterior horns of the old perinæal laceration, and a fourth to the perinæal skin in the middle line. The two triangles are first marked out with a scalpel and the mucous membrane stripped off. The cut edges are then brought together from above downwards by means of a continuous catgut suture, as shown (*v.* Fig. 145, A, G), with the result that the two triangles denuded of epithelium are converted into two linear wounds. The oval piece by the removal of which the new perinæum is to be formed, is next marked out in the same manner, its base being continuous with the base of the two triangles (Fig. 145), and the mucous

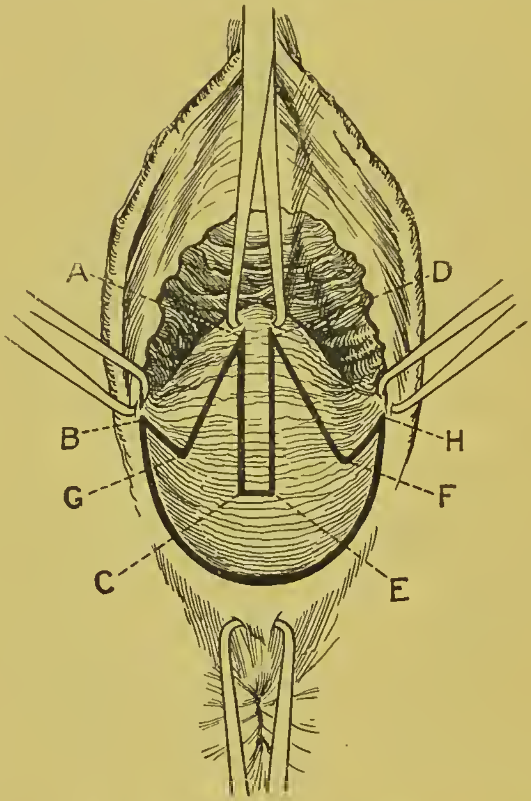


FIG. 144.—Martin's colpo-perinæorrhaphy. Diagram showing the shape of the area to be denuded.

membrane is stripped off. The cut edge of vaginal mucous membrane is then folded on itself and brought together in the middle line by a continuous catgut suture, in such a manner that the points G C and E F are brought together and the points B and H (*v.* Fig. 146). Lastly, the cut edges of skin are brought together and the raw surface is folded on itself by sutures of silkworm gut passed from the skin surface of the perinæum, as in Hegar's colpo-perinæorrhaphy (*v.* Fig. 155).

FIG. 145.

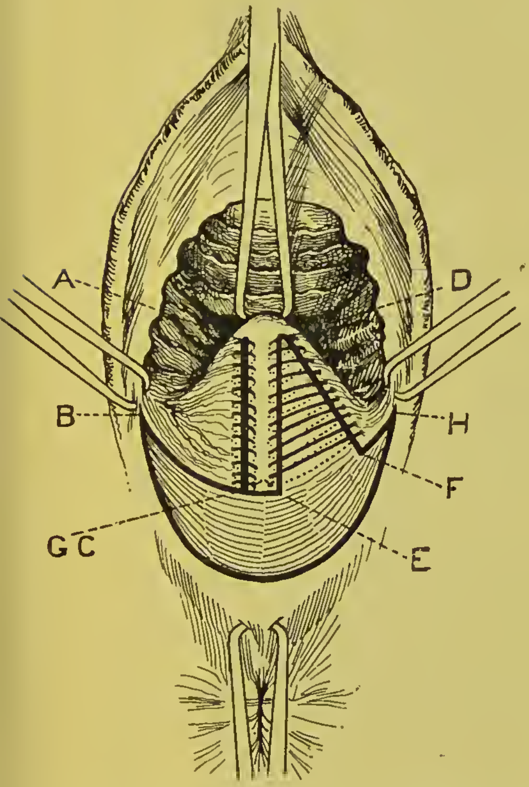


FIG. 146.

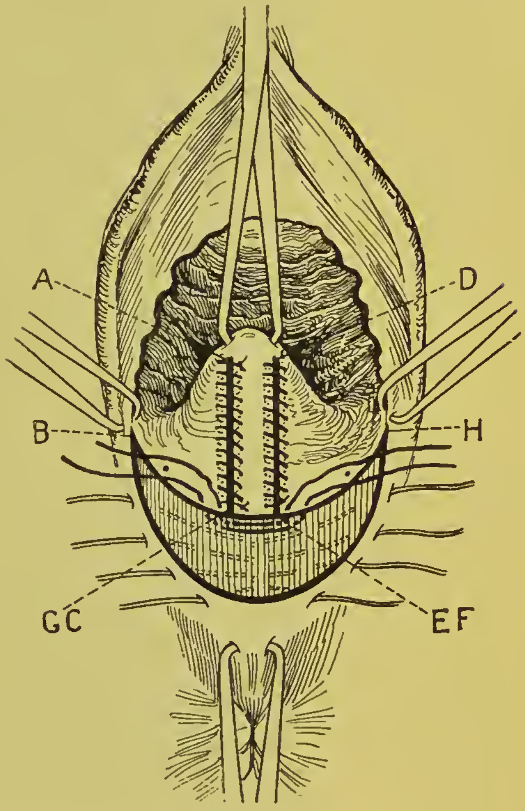


FIG. 145.—Martin's colpo-perinæorrhaphy. The triangles and base oval have been denuded. The right-hand triangle has been sutured, and the left-hand triangle is being sutured.

FIG. 146.—Martin's colpo-perinæorrhaphy. The triangles have been sutured, and the sutures are in position in the perinæal oval. The black sutures are tied on the vaginal aspect of the wound, the white on the perinæal aspect.

The retention of the median *raphé* of the vaginal wall is said to be a great advantage, but the operation is perhaps a little more tedious than is necessary.

(c) **Kelly's Colpo-perinæorrhaphy.**—Kelly's operation consists in the removal of two triangles of mucous membrane from the lateral vaginal walls and of a crescentic portion from the cicatrised area of perinæal laceration. It resembles Martin's operation, the chief difference being that the triangles of

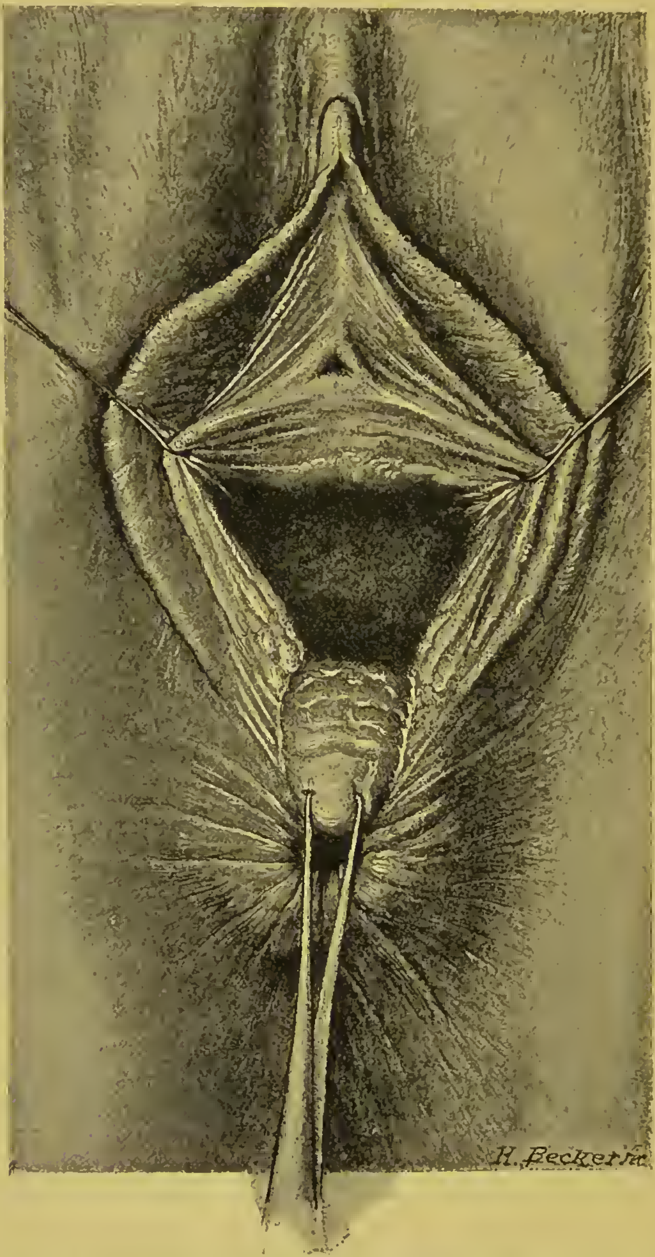


FIG. 147.—Kelly's colpo-perinæorrhaphy. The shepherd's crook tenacula are fixed at the sides, below the urethra, and the forceps draws the posterior column downward, so as to expose the lateral vaginal walls where the triangular denudations are to be made. (*Kelly.*)

mucous membrane are removed more from the lateral than the posterior vaginal wall. The first step consists in defining the limits of denudation by applying two bullet forceps or shepherd's crook tenacula to the skin at the anterior horns of the crescentic-shaped area, and a third to the posterior vaginal wall in the middle line on the crest of the prominence formed by the rectocele (*v.* Fig. 147). The next step consists in marking out the edges of the proposed denudation with a scalpel. As the surface to be denuded is very irregular and occupies several planes, only a part of it can be made tense at

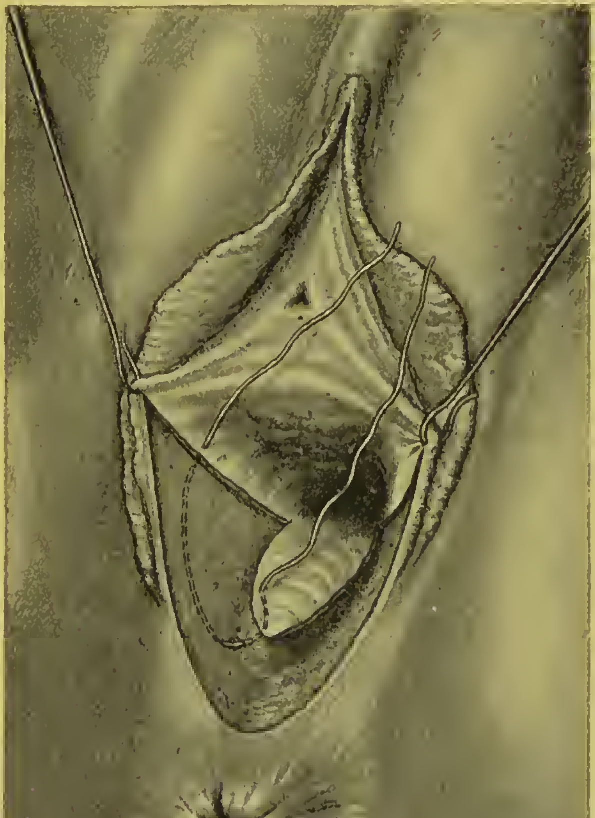


FIG. 148.—Kelly's colpo-perinæorrhaphy. The silkworm-gut tension suture is placed in the triangle on the right side. The dotted lines represent the part of the suture which lies concealed under the surface. The short piece of the suture visible as a white line at the bottom of the denudation is the part which is exposed by bringing the needle out at the bottom of the wound and re-entering it close by. (*Kelly.*)

the time and exposed to view. By compressing the posterior vaginal wall and drawing the left-hand tenaculum and the centre forceps apart, the right lateral vaginal wall is exposed. Two sides of a triangle are then outlined with the scalpel as shown in the drawing, its apex situated about an inch and a quarter within the outlet, at the junction of the anterior and lateral vaginal walls. (*v.* Fig. 148). The first delimiting incision runs from the apex to the anterior tenaculum, and is parallel to and just below the anterior wall. The second incision runs from the apex to a point immediately below the forceps which was applied to the prominence of the rectocele. The same two

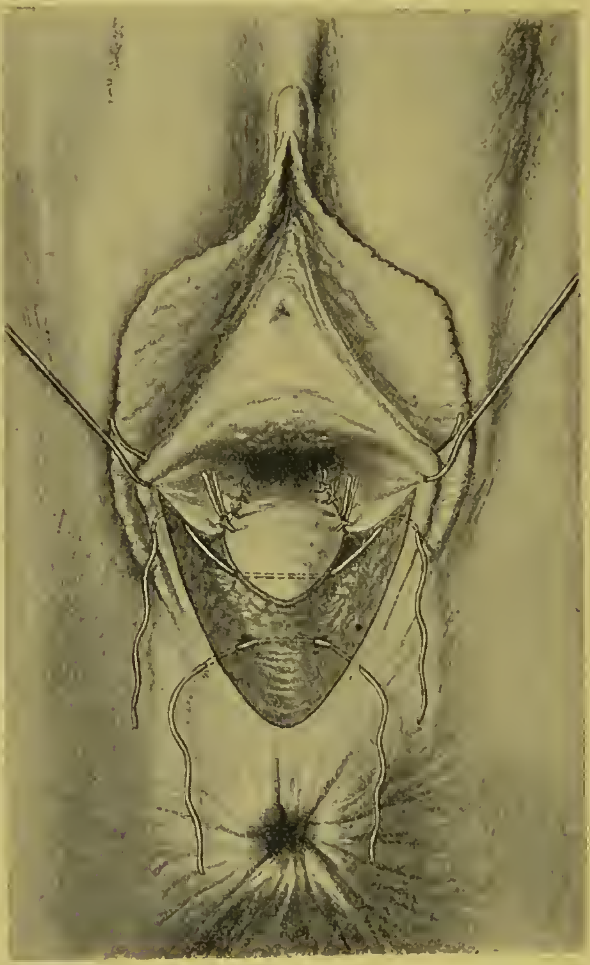


FIG. 149.—Kelly's colpo-perinæorrhaphy. The inside sutures are now introduced and tied in both sulci. The gathering suture of silkworm gut is introduced above across the angles, but is not tied. An auxiliary suture introduced to close the wound below this is also left untied. (*Kelly.*)

sides of a similar triangle are then marked out on the opposite lateral wall of the vagina, and the outline is completed by a semicircular incision extending round the posterior wall at the junction of skin and mucous membrane. The portion of mucous membrane thus marked out is then removed, either in one piece or in a succession of strips, and the edges of the wound surface are brought together by a few deep silkworm-gut sutures and several catgut sutures. The first suture is of silkworm gut and brings together the lateral edges of one triangle. It is passed as shown in Fig. 148, tied sufficiently tightly, and then drawn down so as to expose the upper part of the wound. The edges of the latter are then brought together by three or more deep catgut sutures, care being taken to obtain exact coaptation. The sutures are passed from below upwards, and

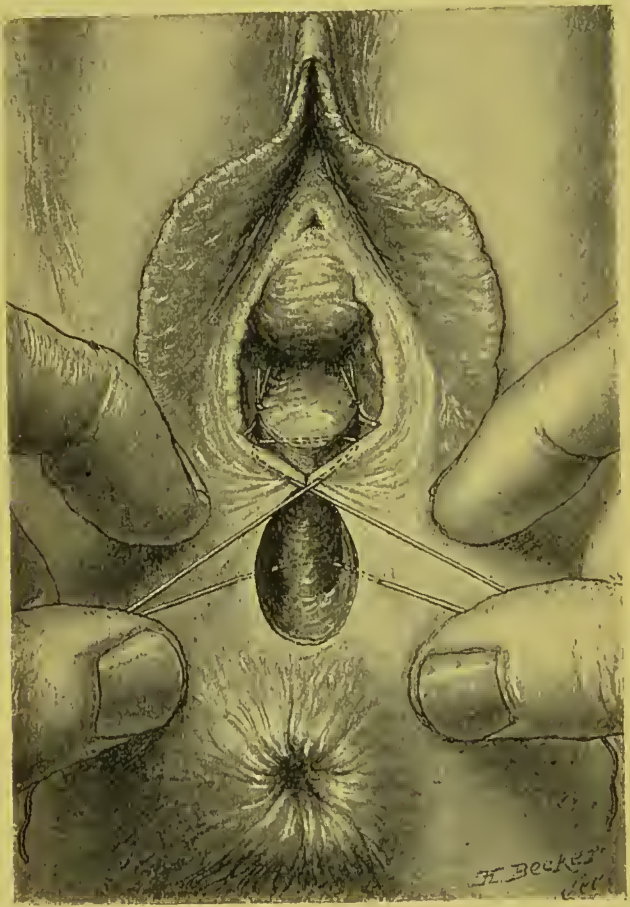


Fig. 150.—Kelly's colpo-perinæorrhaphy. Showing how the gathering suture above draws together the tissues. (*Kelly.*)

each is in turn used as a tractor to expose a higher part of the cut edges. The opposite triangle is then treated in the same manner. The greater part of the vaginal aspect of the remaining raw area can now be brought together by what Kelly terms a "gathering suture" of silkworm gut, passed as shown in Fig. 149. It is entered through the perinæal skin at the anterior end of the left perinæal horn, emerges just below the cut vaginal edge external to the left-hand triangle, is re-entered just below the cut internal edge of the same triangle, then passes beneath the centre tongue of mucous membrane, emerges just below the cut internal edge of the right-hand triangle, and again enters just below the cut vaginal edge external to the right-hand triangle, to appear through the skin at a point corresponding to that at which it was entered. A second and, if necessary, a third deep suture of the same material are then passed posterior to it, and superficial inter-

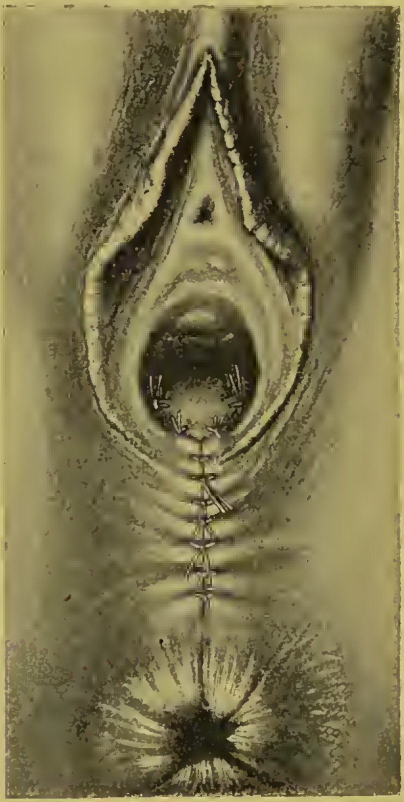


FIG. 151.—Kelly's colpo-perinæorrhaphy. Operation completed. The sutures with longer ends, two inside and two outside, are of silkworm gut; the others are all of catgut.

rupted sutures between in order to bring the edges of the perinæal skin accurately together (*v.* Fig. 151).

(D) **Hegar's Incomplete Colpo-perinæorrhaphy.**—Hegar's operation consists in the removal of one triangular portion of mucous membrane from the posterior vaginal wall The base of this triangle corresponds with the junction of the mucous membrane covering the old laceration and the perinæal skin. The apex is situated on the posterior vaginal wall, in the middle line and from two to three and a half inches from the perinæum, according to the case. The author prefers the following slight modification of the classical operation which has just been described, as it can be performed in a shorter time and with less assistance.

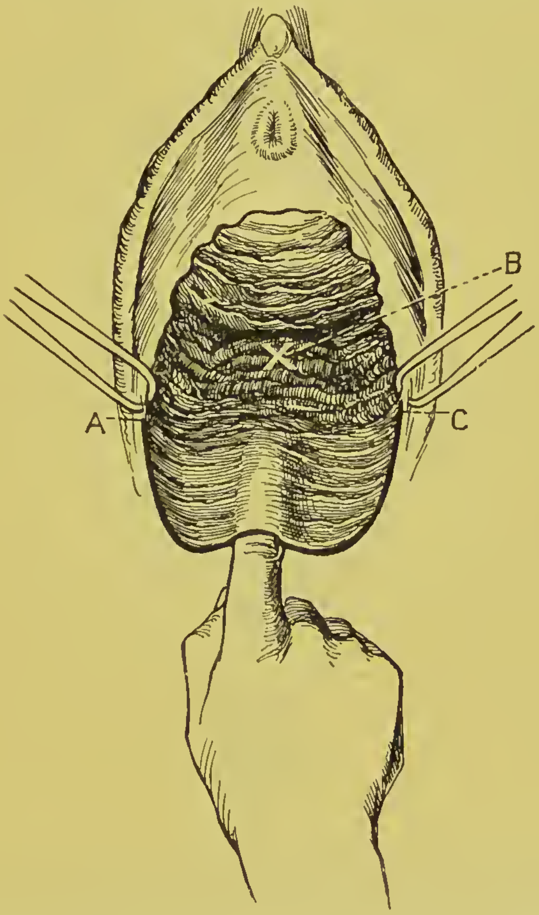


Fig. 152.—Hegar's incomplete colpo-perinæorrhaphy. A, C. The initial incision at the junction of the skin and mucous membrane. The finger is detaching a vaginal flap. B. The cross at the apex of the triangle which is to be detached.

Commence the operation as if it was intended to perform Lawson Tait's perinæorrhaphy, *i. e.* two American forceps at the extremities of the cicatricial crescent, and one in the middle line just behind the junction of skin and mucous membrane (*v.* Fig. 140). With a sharp-pointed scissors an incision is made round the posterior wall from one bullet forceps to the other, at the junction of skin and mucous membrane. It is similar to that made in Tait's operation, save that it is not carried so deeply into the perinæal body, but rather tends to keep as close as possible to the vaginal mucous membrane. With the finger, the vaginal flap so commenced is separated from the rectum by pushing the latter backwards, and this separation is continued until a piece of mucous membrane which is roughly a triangle

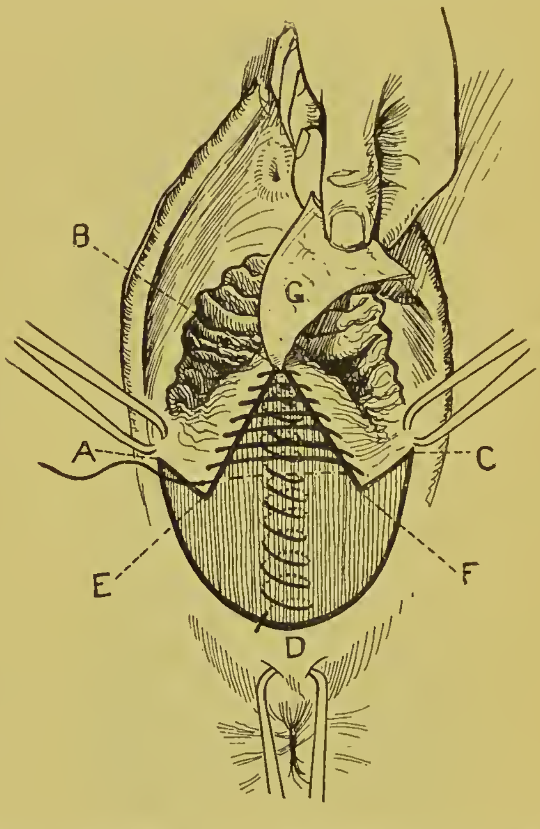


FIG. 153.—Hegar's incomplete colpo-perinæorrhaphy. The flap G of mucous membrane has been detached and is drawn upwards by an assistant. The deep catgut sutures have been inserted, and also the superficial sutures as far as that point at which they cease to include the submucous tissue. (The superficial sutures are shown slack in order to expose the buried sutures beneath.)

with concave sides and corresponds in size and position to the flap which is removed in the ordinary Hegar's operation, is subcutaneously detached (*v.* Fig. 152). This flap, G, is then freed from its lateral vaginal attachments with scissors, and only remains connected to the vagina by a narrow strip of mucous membrane about a quarter of an inch wide at the very apex (*v.* Fig. 153). The object of allowing the flap to remain attached at the apex is, that, by pulling upon it the upper portion of the wound can be drawn down, and so the application of an American forceps rendered unnecessary.

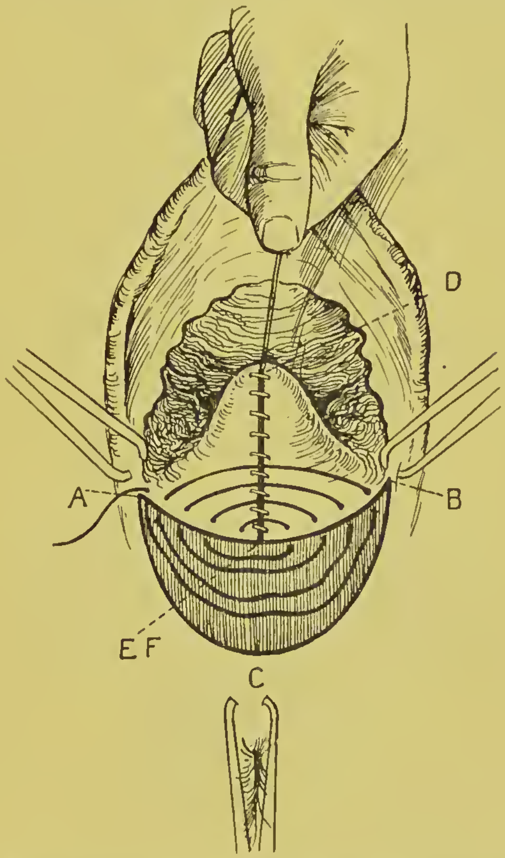


FIG. 154.—Hegar's incomplete colpo-perinæorrhaphy. The sutures in the upper part of the vagina have been drawn tight, and the sutures in the lower part—which only include the vaginal mucous membrane—are in position.

The wound is sutured as follows:—With a small needle threaded with catgut the operator commences below, just inside the perinæal skin, and works upwards towards the upper angle which is exposed by pulling down the flap. The sutures are passed from side to side and in such a manner as to approximate the centre two-fourths of the raw area (*v.* Fig. 153). Care must be taken not to pass them too deeply, as there is not a great depth of tissue in front of the rectum. As soon as the upper angle, B, of the wound is reached, the needle traverses the mucous membrane as well as the submucous tissue; and, when the first suture has been passed in this manner, the flap of vaginal mucous membrane may be finally removed by snipping across the remaining strip. The suturing is then continued

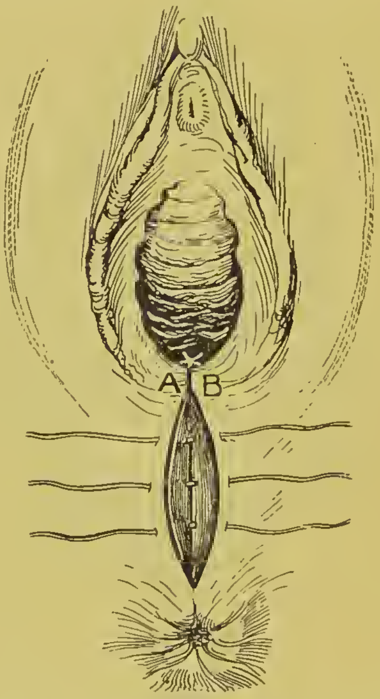


FIG. 155.—Hegar's incomplete colpo-perinæorrhaphy. The vaginal sutures are tied, and the perinæal sutures have been inserted. (These sutures are passed more deeply than is shown in the figure.)

from above downwards, but the sutures are now passed in such a manner as to include the edges of the vaginal mucous membrane as well as the remaining portion of the base of the wound. As soon as a point is reached on the vaginal wall about three-quarters of an inch above the skin perinæum—that is to say a point, E and F, which roughly corresponds with the upper limit of the old perinæal laceration, the sutures are passed so as to include the vaginal mucous membrane alone (*v.* Fig. 154). By so doing, we avoid compressing the perinæal body from before backwards, and reconstitute the original outline of the posterior vaginal wall. The last step consists in passing deep silkworm-gut sutures from the skin surface of the perinæum, with a medium needle, in such a manner as to bring together laterally those portions of the wound which have not been included in the continuous suture (*v.* Fig. 155).

II. Complete Perinæorrhaphy and Colpo-perinæorrhaphy.—Two operations are in common use for the repair of a complete laceration of the perinæum. In the first, Lawson Tait's, no tissue is removed; while in the second a triangle of vaginal mucous membrane is taken away as in Hegar's incomplete colpo-perinæorrhaphy.

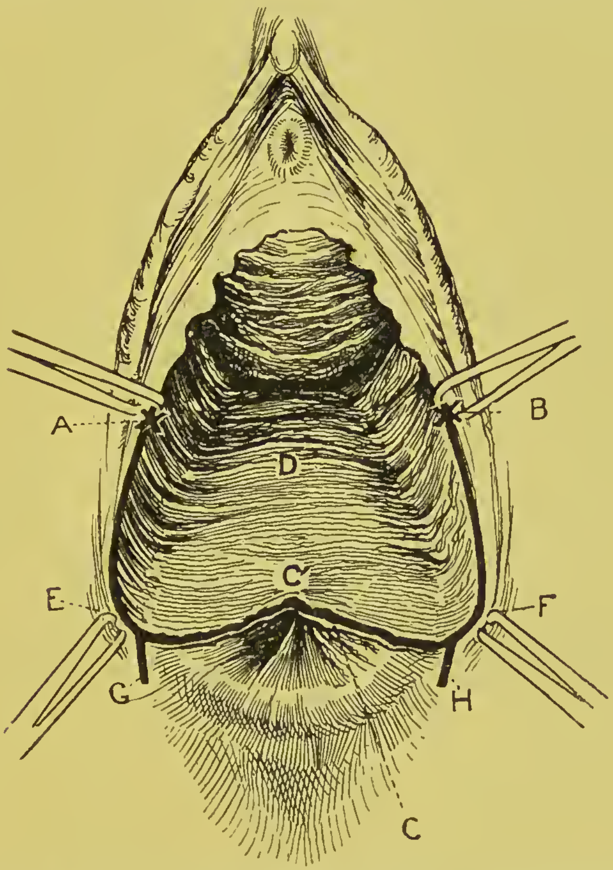


Fig. 156.—Lawson Tait's complete perinæorrhaphy. The area A, E, C′, F, B, D, shows the area of the original laceration. The heavy lines mark the incisions.

(A) **Lawson Tait's Complete Perinæorrhaphy.**—Lawson Tait's operation for complete laceration of the perinæum is performed as follows:—The skin is seized in an American forceps at the anterior limits of the outline of the original laceration, one at either side, and two additional forceps are applied, one at each side, just outside the junction of vagina and anus (*v.* Fig. 156). An assistant at each side then holds one anterior forceps and one posterior forceps, and draws them outwards in such a manner as to place the recto-vaginal septum on the stretch. The scissors are then entered at the point F (*v.* Fig. 156), and passed upwards for about half an inch between the rectal and vaginal mucous membrane, and an incision made from F to E in such a manner as to split the septum. From the ends of this incision two other incisions are made extending forwards, from E to A and from F to B respectively, along the remains of the lower crescentic outline of the original tear, as is done in the case of incomplete rupture. Finally, two incisions, one at either

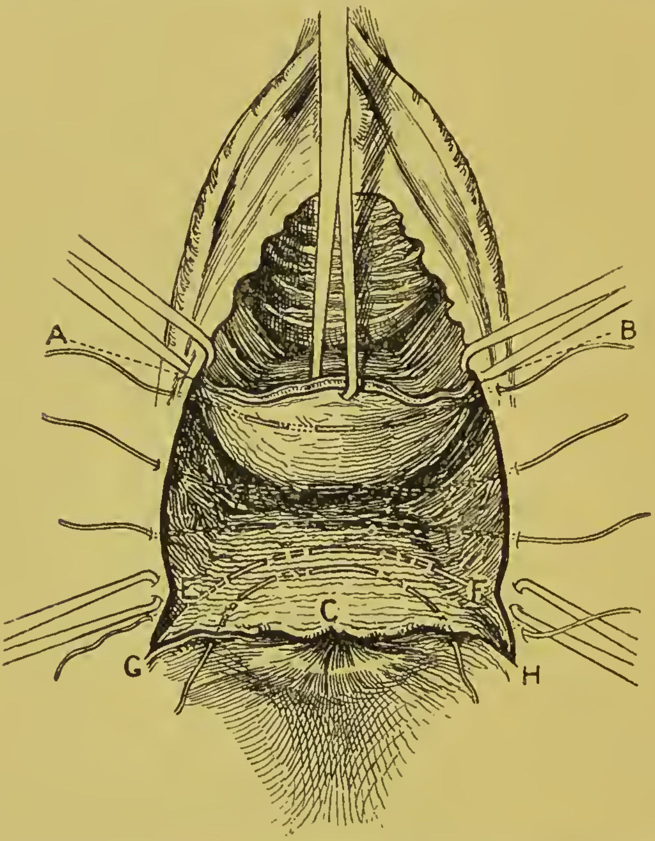


FIG. 157.—Lawson Tait's complete perinæorrhaphy. The recto-vaginal septum has been split, and the posterior vaginal wall drawn forwards by the forceps inserted at C′. The sutures are shown *in situ*.

side, are made from the same points, F and E, backwards and outwards at either side of the rectum as far as the points G and H. By a little dissecting, the vaginal mucous membrane is freed from the rectal wall, so as to permit of the former being drawn downwards and forwards, and the latter downwards and backwards, while at the same time the retracted ends of the divided sphincter muscle are exposed (*v.* Fig 157). The sutures are then passed transversely from behind forwards, as shown in the diagram, in a similar manner to that which has been described. The posterior suture must be passed deeply into the retracted ends of the sphincter, in such a manner as to bring them into apposition when it is tied. The sutures are tied from behind forwards, and bring together successively in the middle line the cut edges C G and C H, and G E A and H F B. The posterior flap which was drawn backwards helps to make up the loss of tissue in the anterior rectal wall, and, similarly, the anterior flap which was drawn forwards to make up the deficiency in the posterior vaginal wall. Lawson Tait's method of suturing is again departed from. It will be understood by reference to the diagram (*v.* Fig. 143, B).

(B) **Hegar's Complete Colpo-perinæorrhaphy.**—This operation is a most suitable and satisfactory one for all cases of complete laceration of the perinæum, and is probably better than Lawson Tait's operation in cases in which the rectal laceration is of considerable extent. In the following description, the classical method of performing the operation is departed from, particularly so far as the method of suturing is concerned.

Four bullet forceps are applied as in Lawson Tait's operation, and with a fifth the posterior vaginal wall is seized in the middle line at least half an inch above the apex of the rectal tear. The edge of the recto-vaginal septum is then split with scissors as in Lawson Tait's operation, and the ends of the incision carried forward to the bullet forceps at the anterior horns of the perinæal laceration (*v.* Fig. 156). This incision constitutes the base of the triangle of mucous membrane which is to be removed. The sides are then defined with the scalpel by two incisions which run from a point just below the bullet forceps on the posterior wall to the anterior ends of the first incisions. The area of mucous membrane thus marked out is removed, and in this way a raw surface is obtained similar to that in Hegar's incomplete operation, save for the presence of the gap between the vagina and rectum (*v.* Fig. 158). A continuous catgut suture is then commenced at the apex of the rectal tear, and carried down to the anus in such a manner as to bring the edges of the tear into accurate apposition. Each stitch should take up a piece of the rectal wall, but should not pass through the rectal mucous membrane (*v.* Fig. 159). The perinæal laceration has now been turned from a complete to an incomplete laceration, and the remainder of the suturing is performed in a manner identical to that which has been already described in the case of Hegar's incomplete operation. First, the continuous catgut suture is knotted as soon as the anal end of the rectal tear is reached, in order to prevent any risk of the tension of the stitches relaxing. The suture is then continued upwards to the apex of the denuded triangle, in such a manner as to approximate the centre two-fourths of the raw area. The suture is then continued again downwards, and this time takes in the vaginal mucous membrane (*v.* Fig. 160). For the upper half of the wound the base is included in each stitch, but, for

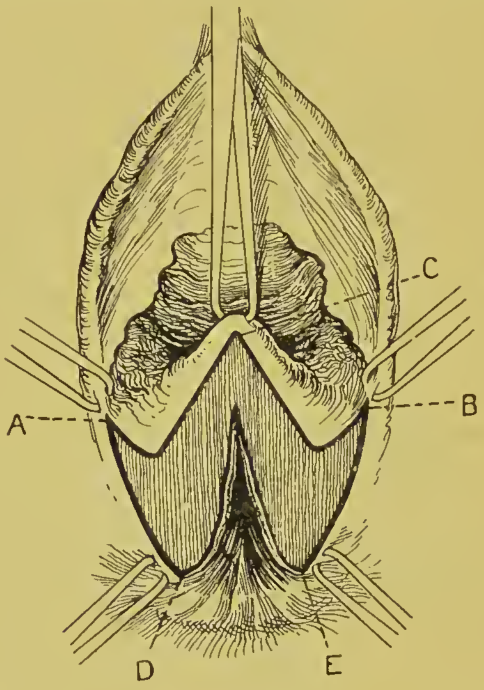


FIG. 158.—Hegar's complete colpo-perinæorrhaphy. A, C, B, E, D. The denuded area.

the lower half, the vaginal mucous membrane is alone traversed by the sutures. Finally from three to four silkworm-gut sutures are passed from the perinæal skin as shown in Fig. 155, in order to bring together the lateral edges. Care must be taken that the posterior suture passes deeply into the external sphincter and brings together, so far as possible, its divided edges.

Complications.—The only special complication which need be feared is the wounding of the rectum either with the scissors or needle, and the subsequent formation of a recto-vaginal fistula. Wounding with the scissors is most unlikely to occur. And if care is taken always to pass the perinæal sutures parallel to the rectum, and perpendicular to the skin surface, and never to direct them backwards, it is rarely necessary to pass the finger into the rectum as a guide, although, if there is any doubt as to the exact situation of the latter, this precaution may be taken. Even if a suture does accidentally pass into the rectum the danger of a fistula resulting is very slight, but such an occurrence imports a fresh danger into the case, *i. e.* the risk of infecting the wound.

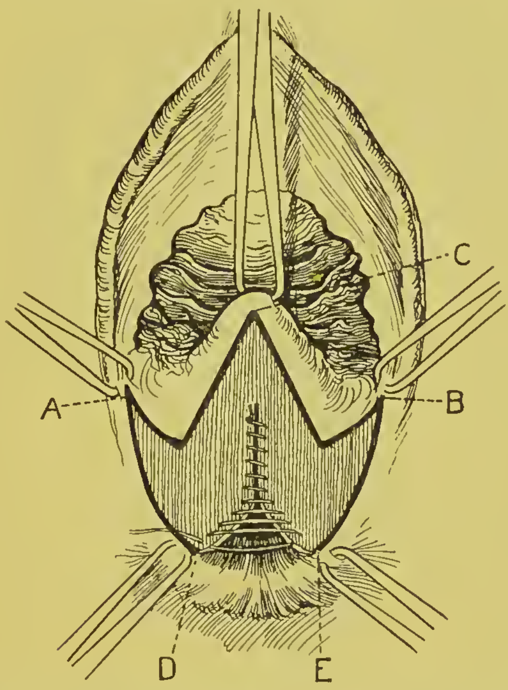


FIG. 159.—Hegar's complete perinæorrhaphy. Suturing of the tear in the rectal wall.

After-treatment.—A light plug of iodoform gauze is placed in the vagina, and the end allowed to project and hang over the wound. If wished, boric powder or iodoform may be dusted on. The external parts are carefully washed night and morning, and kept as dry as possible. If there is any putrefactive or purulent discharge the vagina may be douched, otherwise it is unnecessary. Silkworm-gut sutures are removed on the eighth day; the catgut sutures are absorbed. The patient is allowed to sit up in bed on the twelfth to the sixteenth day, according to the amount of tissue which has been removed and the consequent strain upon the sutures, and to leave her bed a day or two later. In order to avoid any risk of the accumulation of hard fæces in the bowel, it is well to give a purgative on the evening of the second day after the operation, and to administer an enema of olive oil just before the bowels act. For the same reason, the bowels must be emptied before the operation to remove any hard masses that may be present.

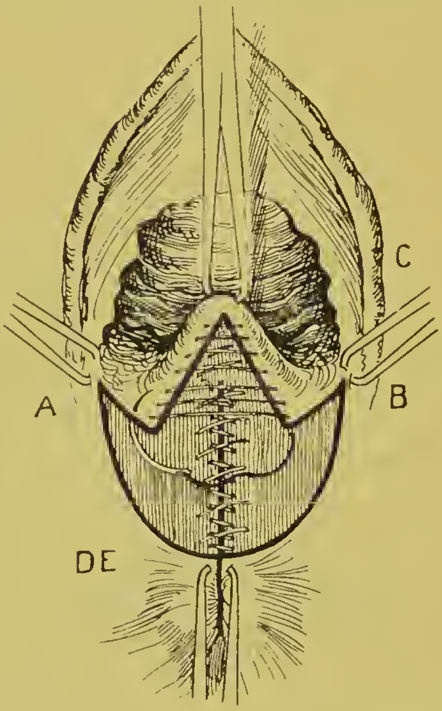


FIG. 160.—Hegar's complete colpo-perinæorrhaphy. The tear in the rectal wall sutured and the deep catgut sutures inserted, and also the superficial sutures down to the point at which they cease to include the submucous tissue.

ANTERIOR COLPORRHAPHY.—By the term anterior colporrhaphy (*κόλπος*, a vagina; *ῥαφή*, a seam) is meant the narrowing of the vagina by the removal of a portion of the mucous membrane of the anterior vaginal wall.

Indications.—Anterior colporrhaphy is indicated in cases of cystocele in which the use of a pessary is either undesirable or valueless.

Instruments.—The instruments required are the same as those used for perinæorrhaphy (*v.* page 282).

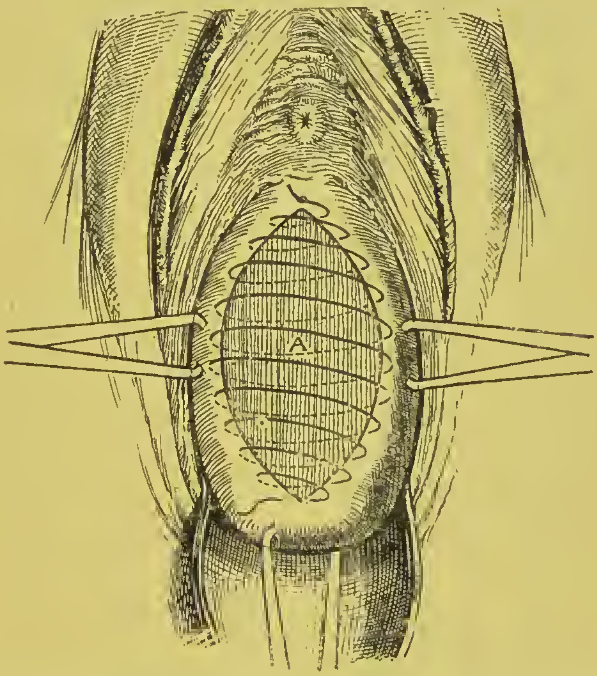


FIG. 161.—Anterior colporrhaphy. An oval flap, A, has been removed from the anterior vaginal wall, and the edges of mucous membrane are brought together by a continuous catgut suture.

Operation.—The cervix is drawn downwards as far as possible, by means of an American forceps fixed on the anterior lip of the cervix. The mucous membrane just below the urethra is seized in a second forceps applied in the middle line in such a manner that by traction in opposite directions on both forceps the anterior vaginal wall can be made tense. If necessary, this tension can be increased by two forceps inserted laterally as shown, and so far distant from one another that their easy approximation is just possible. An incision is then made with a scalpel surrounding an oval piece of mucous membrane (*v.*

Fig. 161). The latter is peeled off, and the edges of the wound brought together with a continuous catgut suture. Care must be taken when making the initial incision to go through the entire thickness of the mucous membrane, as otherwise its complete removal is much more troublesome. If there is considerable tension on the sutures, it is well to supplement and support the continuous catgut suture by a couple of interrupted stitches of silkworm gut.

Complications.—The only complication which is at all likely to occur is the wounding of the bladder, either while dissecting off the flap or during the process of suturing. On account of the possibility of the former accident occurring, it is always safer, as well as being more rapid, to peel off the flap whenever possible, and not to dissect it off.

After-treatment.—The after-treatment is the same as for posterior colporrhaphy. The sutures being catgut will absorb. The patient may sit up on the tenth day.

Colpocleisis.—By colpocleisis (κόλπος, the vagina; κλεῖσις, a shutting up) is meant the permanent obliteration of the vaginal canal at any level. It is an operation which is very rarely necessary, and which will be still more rarely required as our surgical knowledge advances.

Indications.—Colpocleisis may be indicated as a last resource in:—

(1) Intractable urinary or fæcal fistulæ, opening into the vagina (*v.* page 214).

(2) In certain cases of prolapse, occurring in old women.

Operation.—In the case of fistulæ, a circular portion of mucous membrane is removed below the fistula, and the anterior and posterior vaginal wall then brought into contact with sutures. In the case of prolapse, it is well to remove a piece of mucous membrane of sufficient size to effect the obliteration of a great part of the vagina.

If the fistula is situated at a very low level, it may be necessary to close not the vagina but the vulva. This operation, which is now practically never necessary, is known as episiorrhaphy (ἐπίσειον, the region of the pelvis; ῥαφή, a seam).

Removal of Vaginal Cysts, etc.—Vaginal cysts are removed—if small—in the same manner as vulvar cysts (*v.* page 280).

Atresia of the Vagina.—The operation for the cure of vaginal atresia is the same as that recommended by Amussat for creating an artificial vagina.

Operation.—Under the guidance of a finger in the rectum, the imperforate end of the vagina is incised. The rectum is then pushed backwards and the bladder forwards, until the bulging caused by the retained menstrual discharge is felt. An opening is made into this cavity with a trocar and then with a scalpel, the accumulated discharge is washed out, and the entire canal plugged firmly with iodoform gauze. This plugging must be changed daily and continued for some time in order to ensure that the opening remains patent.

In some cases, it may be possible to bring the mucous membrane that lines the upper portion of the vagina into contact with the mucous membrane below the obstruction, and to suture it there. If this can be done, it is the best method of ensuring the continued patency of the canal.

CHAPTER XX.

MINOR OPERATIONS ON THE UTERUS.

Amputation of the Cervix: Supra-vaginal Amputation—Indications—Instruments—Operation—Complications—After-treatment. Amputation of the Vaginal Portion—Indications—Instruments—Operation—After-treatment. Trachelorrhaphy — Indications — Instruments — Operations; Sänger's, Emmet's—After-treatment. Division of the Cervix—Indications—Instruments—Operations; Bilateral Division, Posterior Division—After-treatment. Dilatation of the Cervix—Indications—Instruments—Operations; Gradual Dilatation, Rapid Dilatation—After-treatment. Curetting—Indications—Instruments—Operation—After-treatment—Complications. Removal of Submucous Myomata—Indications—Instruments—Operation—After-treatment — Complications. Curetting and Cauterisation of Irremovable Malignant Disease — Indications—Instruments—Operation—Complications—After-treatment. Reposition of Adherent Retro-deviated Uterus—Indications—Instruments—Operation—Complications.

AMPUTATION OF THE CERVIX.

Amputation of the cervix may be performed either above or below the cervico-vaginal junction. Accordingly two operations must be described:—

I. Supra-vaginal amputation of the cervix.
II. Amputation of the vaginal portion of the cervix.

I. Supra-vaginal Amputation.—*Indication.*—The only indication for supra-vaginal amputation of the cervix is hypertrophy of the supra-vaginal portion of the cervix. The treatment of malignant disease of the cervix by supra-vaginal amputation has now been completely given up in favour of vaginal or abdominal hysterectomy.

Instruments.—Three American forceps; posterior speculum; small and medium whole-curved needles; Martin's needle-holder;

scalpel; scissors; sound; metal catheter; toothed dissecting forceps; and half a dozen clip forceps (*v.* Figs. 7, 104—107, 115).

Operation.—A posterior speculum is passed, the cervix is seized and drawn down by means of two American forceps one on either lip, and the relationship of the bladder to it is noted by passing a catheter into the latter. An incision is then made round the cervix through the vaginal mucous membrane, taking care to keep below the point to which the bladder extends, and, with the finger, the mucous membrane is pushed upwards off the cervix, commencing anteriorly and continuing right round. When as much of the cervix as it is desired to remove has been exposed, the exposed portion is split transversely from below upwards. By this means, the cervix is divided into two lips, an anterior and a posterior. The forceps on the posterior lip is then given to an assistant to hold, while the anterior lip is cut off by an incision carried straight across it, and perpendicular to the cervical canal, to meet the former incision at its highest point. Three or four silkworm-gut sutures are then passed, first through the anterior flap of vaginal mucous membrane half an inch from its edge, and then through the thickness of the cervix from before backwards to emerge through the mucous membrane of the cervical canal. The ends of these sutures are twisted into a rope and given to the assistant to hold, while the operator takes the posterior forceps and amputates the posterior lip in a similar manner to the anterior. Sutures are then passed through the posterior flap of vaginal mucous membrane and the stump of the posterior lip, to emerge again through the cervical mucous membrane. The posterior sutures may now be tied, taking care while doing so to draw the vaginal mucous membrane over the stump into contact with the cervical mucous membrane. The anterior sutures are next tied in the same manner, and, finally, a couple of sutures are inserted at either side to draw the lateral vaginal mucous membrane into its place.

Complications.—The chief accident that may happen is the wounding of the bladder. This is avoided by carefully noting the position of the latter at the start, and then by pushing it well up out of the way with the finger when clearing the cervix. The uterine arteries may also be cut, or wounded by the needle, and the peritoneal cavity may be opened. The former of these can be avoided by clearing the cervix thoroughly at the sides and so pushing the arteries upwards, while the latter is of no importance if strict asepsis has been preserved.

After-treatment.—A plug of iodoform gauze is placed in the vagina, and removed on the evening of the second day. The patient is allowed to sit up on the tenth day, and the sutures are removed on the twenty-first.

Fig. 162.

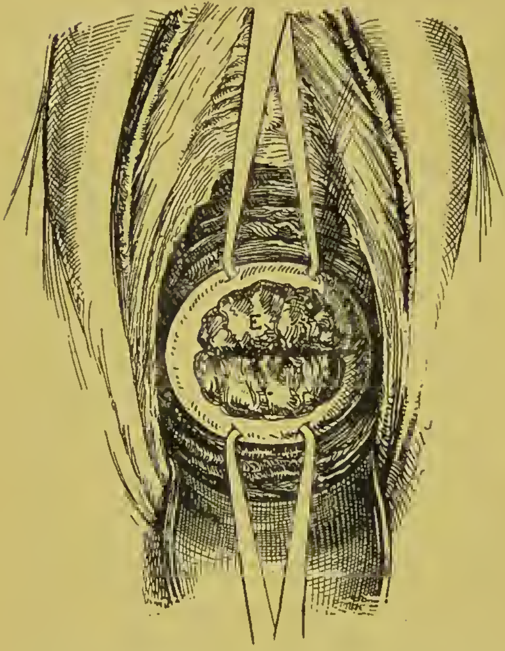


Fig. 163.

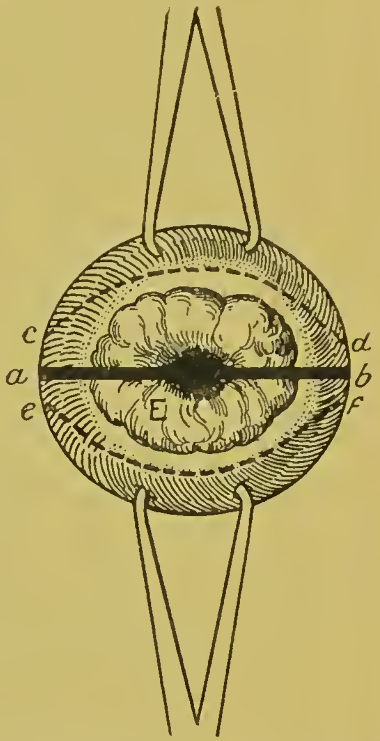


Fig. 162.—Erosion of the cervix. The cervix drawn down to the vulva and held in position by two American forceps. E. Erosion.

Fig. 163.—Schroeder's amputation of the cervix. *a, b.* The bilateral incision, *c, d,* and *e, f.* The course of the amputating incisions across the mucous membrane of the cervix.

II. Amputation of the Vaginal Portion of the Cervix.—This operation is much more frequently required than is supra-vaginal amputation.

Indications.—Amputation of the vaginal portion is indicated under the following conditions:—

(1) A large erosion.
(2) Ectropion accompanied by hypertrophy.
(3) Infra-vaginal hypertrophy.
(4) Subinvolution affecting the entire uterus.
(5) Stenosis of the lower portion of the cervical canal.

Instruments.—The instruments are the same as those required for supra-vaginal amputation (*v.* page 308).

Fig. 164.

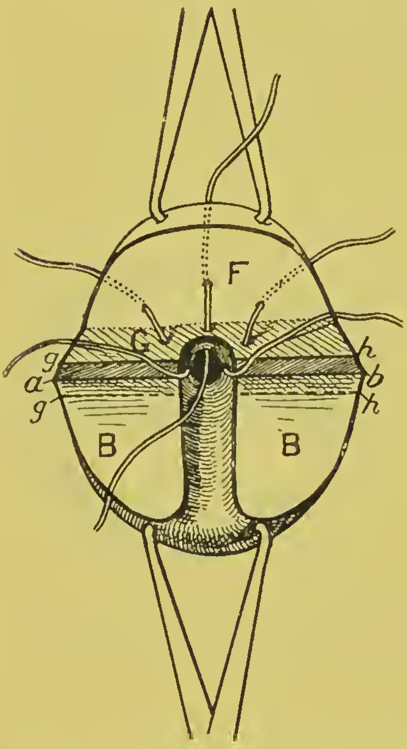


Fig. 165.

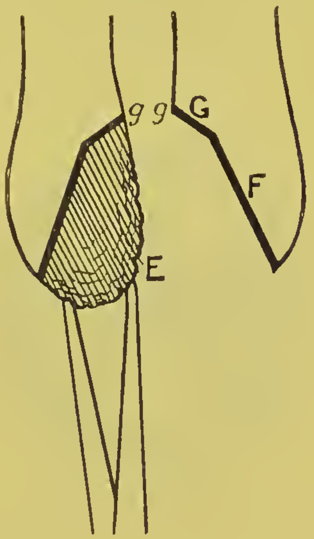


Fig. 164.—Schroeder's amputation of the cervix. A wedge-shaped piece has been removed from the anterior lip, leaving two cut surfaces, G and F, by an incision starting at g, h, to meet the former incision, c, d, in the depth of the cervix. As a result two raw surfaces, G and F, are left. a, b. Termination of bilateral incision. g', h'. Course of transverse incision across cut surface, B, of posterior lip. The sutures in the anterior lip in position.

Fig. 165.—A side view of Fig. 164. Lettering as before.

Operations.—There are two chief methods of amputating the cervix in common use—Schroeder's and Simon-Marckwald's. The former is the more suited for cases of erosion, and of ectropion of the cervix associated with endocervicitis; the latter for cases of infra-vaginal hypertrophy, subinvolution of the uterus, and stenosis of the lower part of the cervical canal.

(A) **Schroeder's Operation.**—Schroeder's operation, which is perhaps more correctly termed an excision of the cervical mucous membrane rather than an amputation, is performed as follows:—

A posterior speculum is passed, the cervix is seized in two American forceps, so placed that they catch the anterior and posterior lip just beyond the piece which is to be removed, and the cervix is drawn down to the vulva (*v.* Fig. 162). The cervix is then split transversely, as in supra-vaginal amputation, and so divided into an anterior and posterior lip (*v.* Fig. 163, *a*, *b*). A third forceps then seizes the anterior lip, in the centre of the portion which it is desired to remove, and by means of two incisions which meet one another in the depth of the cervical tissue the piece of cervix included in the forceps is cut out (*v.* Figs. 164, 165).

Fig. 166.

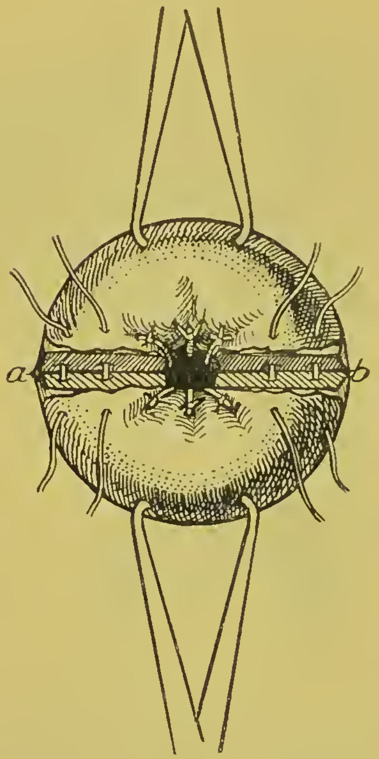


Fig. 167.

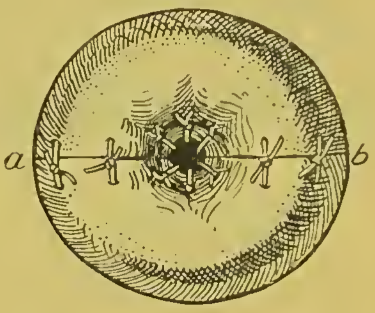


Fig. 166.—Schroeder's amputation of the cervix. The sutures which bring together the surfaces G and F (*v.* Figs. 164 and 165) are tied, and the sutures which close the bilateral incision are in position.

Fig. 167.—The operation completed.

The first incision runs transversely across the mucous membrane covering the anterior lip, and follows the course shown by the line *c*, *d*. The second incision runs across the cut surface of the anterior lip and follows the line *g*, *h*, to meet the first incision in the depth of the cervical tissue (Figs. 164, 165). It should cut the mucous membrane transversely and be made as high up the cervical canal as possible. This makes the operation somewhat difficult, especially so far as the obtaining subsequent exact coaptation of the cut edges is concerned. As a result, many operators—frequently unintentionally—perform the conical amputation of Simon-Marckwald instead of Schroeder's operation.

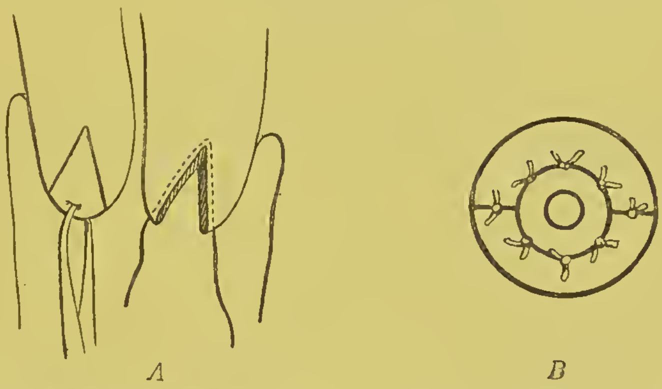


FIG. 168.—Simon-Marckwald's amputation of the cervix. A. On one lip the lines of incision are shown, on the other one suture is *in situ*. B. The result of the amputation. All sutures *in situ* and tied.

Three sutures are next passed. These are entered just inside the edge of the vaginal mucous membrane, pass beneath the raw surface and emerge through the cervical mucous membrane. They may be tied at once in order to check bleeding, and bring the mucous membrane covering the vaginal portion of the cervix into contact with the mucous membrane of the cervical canal. Silkworm gut is the best material (*v*. Figs. 164, 166).

The posterior lip is next treated in the same manner, and the sutures passed as in the anterior lip. The last stage consists in passing two sutures at both sides of the os externum to bring together the edges of the primary transverse incision (*v*. Figs. 166, 167).

(B) **Simon-Marckwald's Operation.**—This operation differs from the preceding in the shape of the removed portion of cervical tissue. The latter is wedge-shaped, and little or no cervical mucous membrane is removed. The coaptation of the cut edges is easier than in Schroeder's operation, and there is consequently not the same risk of subsequent cicatricial stenosis of the cervix.

The steps of the operation are identical with those of Schroeder's operation. The cervix is first split transversely, next a wedge-shaped piece is moved successively from each lip, in the manner shown in the diagram (*v.* Fig. 168), the resultant gap is closed with silkworm-gut sutures, and finally the edges of the transverse incision are similarly brought together.

After-treatment.—The after-treatment is the same as for supra-vaginal amputation (*v.* page 310).

TRACHELORRHAPHY.

Trachelorrhaphy (*τράχελος*, the cervix; *ῥαφή*, a seam) is the term applied to the operation of suturing lacerations of the cervix.

Indication.—Deep laceration of the cervix associated with ectropion of the cervical mucous membrane.

Instruments.—The instruments are the same as those required for supra-vaginal amputation of the cervix (*v.* page 308).

Operations.—There are two operations for the repair of cervical lacerations :—

(A) Sänger's operation.
(B) Emmet's operation.

(A) **Sänger's Operation.**—Sänger's operation is especially suited for lacerations which only involve one side of the cervix, although it can also be adopted in the case of bilateral lacerations if required. The anterior and posterior lips are seized in American forceps, and the cervix drawn downwards, and towards the side opposite to that at which the laceration is situated. Two incisions are then made one at either side of the laceration at the junction of the scar tissue and the healthy mucous membrane (*v.* Fig. 169), and by extending these incisions into the cervical tissue the mucous membrane lining the laceration is dissected up in one piece and drawn towards the centre of the cervical canal, with the object of forming the new endo-cervical boundary of the laceration (*v.* Fig. 170). Special care must be taken that all the cicatricial tissue at the very bottom of the laceration is removed. Sutures of silkworm gut

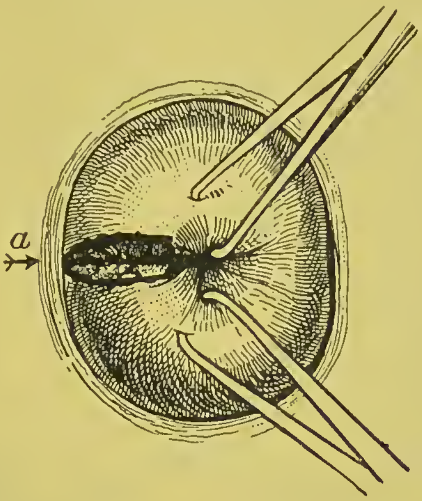


Fig. 169.—Sänger's trachelorrhaphy. The incisions to be made at each side of the laceration are marked by heavy lines. The arrow points to the old laceration.

Fig. 170.

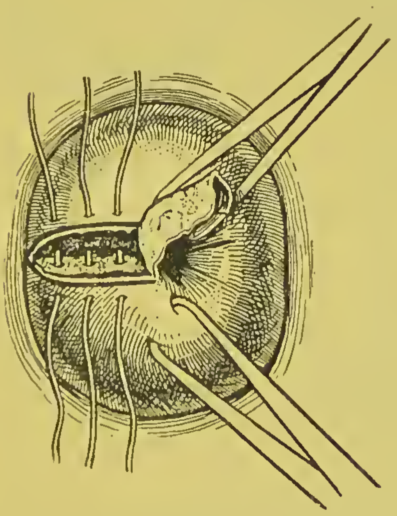


Fig. 171.

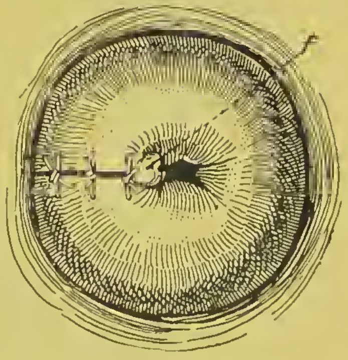


Fig. 170.—Sänger's trachelorrhaphy. The mucous membrane of the laceration dissected up and turned inwards in one piece. Sutures *in situ.*

Fig. 171.—Sänger's trachelorrhaphy. The sutures tied. *f.* The remains of the flap of mucous membrane which was dissected up.

are then passed at right angles to the tear, and tied in such a manner as to bring the cut edges of cervical mucous membrane together (Fig. 171). The number of sutures necessary depends upon the size of the laceration, and varies between two and four. If there is a second laceration, it is treated in the same manner.

(B) **Emmet's Operation.**—Emmet's operation is more radical, and is on that account more likely to give a permanent result. It is especially suitable for bilateral lacerations. The lips are seized, as before, with American forceps, and drawn apart as far as possible. With the scalpel, a transverse incision is made through the bottom of the lacerations, in order to make them both of the same depth. Two antero-posterior incisions are then made on the exposed face of the cervix, running parallel to what was formerly the cervical canal, and about a quarter of an inch apart (*v.* Fig. 172). These incisions extend through

FIG. 172.

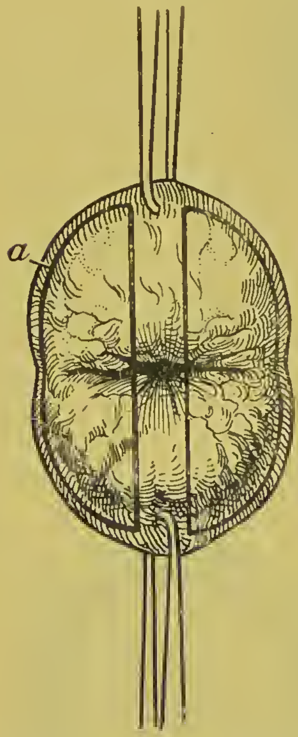


FIG. 172.—Emmet's trachelorrhaphy. The anterior and posterior lips are drawn apart. *a.* The lines of incision marked on the everted surfaces.

FIG. 173.

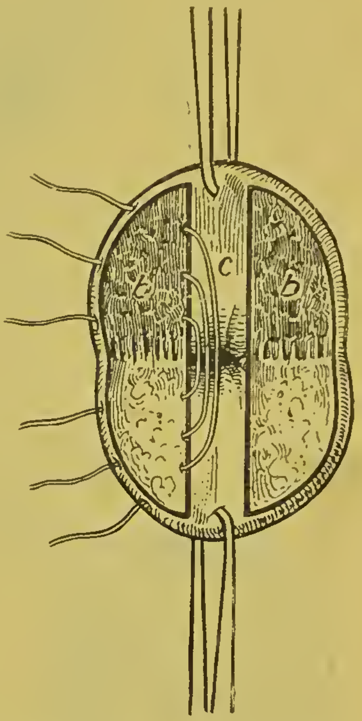


FIG. 173.—Emmet's trachelorrhaphy. The mucous membrane surrounded by the incisions has been removed. Sutures are *in situ* on one side. *b.* Raw surfaces. *c.* Strip of mucous membrane to form new cervical canal.

the mucous membrane alone, and the tissue between them will form the new cervical canal (Fig. 173, *c*). Two more incisions are then made one at either side, connecting the ends of the former incisions, as shown. These follow an imaginary line which formerly had been the outer limit of the cervical tear, and, consequently, the areas lying between each of them and the middle line on the same side, are the areas which must be folded on themselves, and so brought together, in order to restore the cervix to its original shape. The next step is the denudation of these areas. This is most easily done with the scalpel, and must be thorough. The final step is the passing of the sutures. Silkworm gut is the most suitable material, and the manner in which each suture is passed will be most easily understood by reference to the diagram (*v.* Fig. 173). Each suture must go down to, but must not include, the strip of mucous membrane which has been left in the centre. When they are tied the cervix will present the appearance shown in Fig. 174.

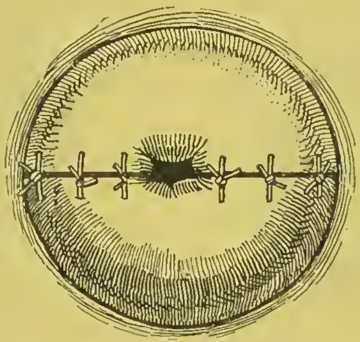


Fig. 174.—Emmet's trachelorrhaphy. The sutures are tied on each side.

After-treatment.—The after-treatment is the same as in the case of amputation of the cervix (*v.* page 310).

DIVISION OF THE CERVIX.

The operation of division of the cervix is performed with the object of either increasing the size of the cervical canal, or of widening the angle of flexion between the axes of the cervical canal and of the body of the uterus.

Indications.—Division of the cervix may be indicated under the following conditions :—

(1) Acquired or congenital stenosis of the cervical canal.

(2) Acquired or congenital acute anteflexion of the uterus.

Instruments.—The instruments are the same as those required for amputation of the cervix (*v.* page 308).

Operations.—Division of the cervix can be performed in two different ways, according to the direction in which the cervix is divided :—

(A) Bilateral division, in which the cervix is divided into an anterior and posterior lip by means of a transverse incision.

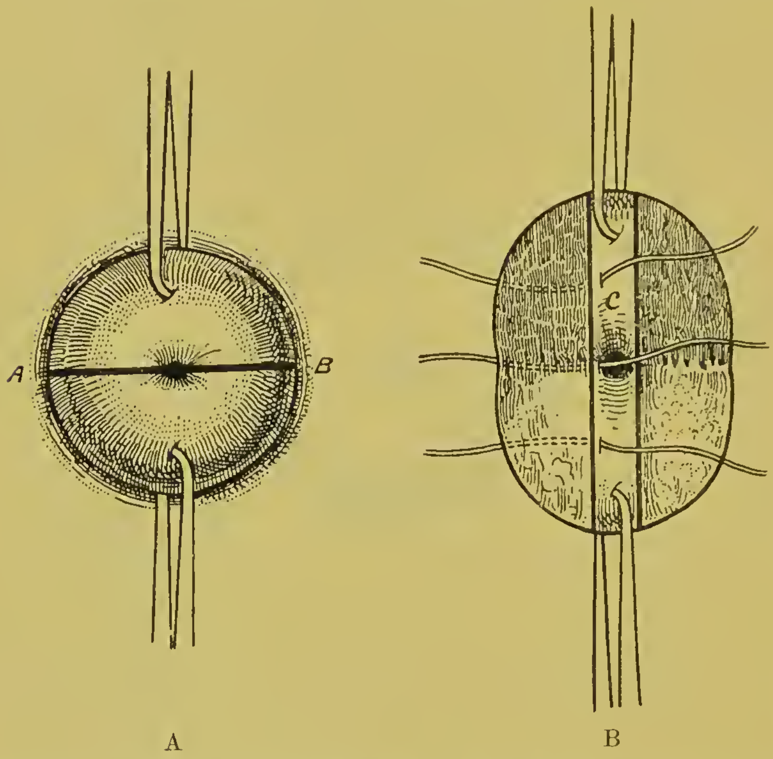


FIG. 175.—Bilateral division of the cervix. A. Line of incision. B. Result of incision, sutures *in situ* on one side. *c.* Mucous membrane of cervical canal.

(B) Posterior division, in which a single incision is made vertically in the middle line of the posterior lip.

(A) **Bilateral Division.**—Bilateral division of the cervix, first introduced by Simpson, is the more usually performed mode of division, on account of the greater ease with which it is carried out. The anterior and posterior lips are seized in American forceps, and the cervix drawn well downwards. With a scalpel or stout scissors, the cervix is split transversely, as is done in the first stage of Schroeder's amputation operation (*v.* Fig. 175 A). The incision is carried as far upwards as possible without cutting into the tissues of the vaginal vault. The final step consists in suturing the mucous membrane of the cervical canal to the mucous membrane covering the outside of the cervix. This is done by three sutures at each side, as shown (*v.* Fig. 175 B). In some cases, there may be a difficulty in bringing the edges together, owing to the rigidity of the cervical tissue. In such cases, this proceeding is facilitated by excising a boat-shaped piece of cervical tissue from the wound surfaces of both lips, between the mucous membrane of the cervical canal and the vaginal mucous membrane (Chrobak). Bilateral division is well suited for those cases in which the cervical stenosis is limited to the region of the os externum. In stenosis of the internal os, it is of no use, as the incisions do not reach sufficiently high.

(B) **Posterior Division.**—Posterior division of the cervix, introduced by Marion Sims, has two advantages over bilateral division. First, there is not the same resultant eversion of the cervical mucous membrane, and secondly, it is usually possible to carry the incision sufficiently high to reach the internal os. The operation of posterior division is usually carried out as follows:—Expose the cervix and seize the posterior lip with two American forceps, one a little to either side of the middle line. A narrow scalpel is then passed into the canal, and by cutting from within outwards, and from the external os upwards, the posterior lip is divided in the middle line up to the vaginal vault (*v.* Fig. 176). Then, by carrying the point of the scalpel up to the internal os, the fibres of the latter can be divided also in the middle line. The latter incision, however, must only extend through half the thickness of the cervical tissue, as, if it traversed the entire thickness, it would emerge above the line of posterior peritoneal reflection. Two sutures are then passed, one at either side, and as high as possible, with the object of bringing the mucous membrane which lines the cervical canal into contact with the mucous membrane which covers the cervix. A small whole-curved needle threaded with stout silkworm gut is entered through the mucous membrane lining the cervical canal at one side of the incision, as high as can be reached, and made to emerge at a corresponding point in the cervical covering mucous membrane (*v.* Fig. 177). A similar suture is then passed at the opposite side of the incision, and the two are tied across the face of the cut surface, in such a manner as to bring the two mucous membranes into contact.

A simple and extremely useful modification of this operation has been introduced by Dudley. Its advantages are :—that no raw surface is left to heal by granulation, as almost always happens in the ordinary posterior division; and that, as well as correcting the stenosis, it corrects to a great extent the pathological flexion of the canal which is so often present. It is performed as follows :—The anterior lip of the cervix is seized with a forceps in the middle line and the posterior lip divided as has been just described (*v.* Fig. 176). In this way, two raw edges are obtained which run the length of the vaginal cervix. The centre of both these raw edges is then caught in a forceps and drawn apart laterally, with the result that the space between the edges becomes lozenge-shaped, and the os externum tends to approach the posterior fornix (*v.* Fig. 178).

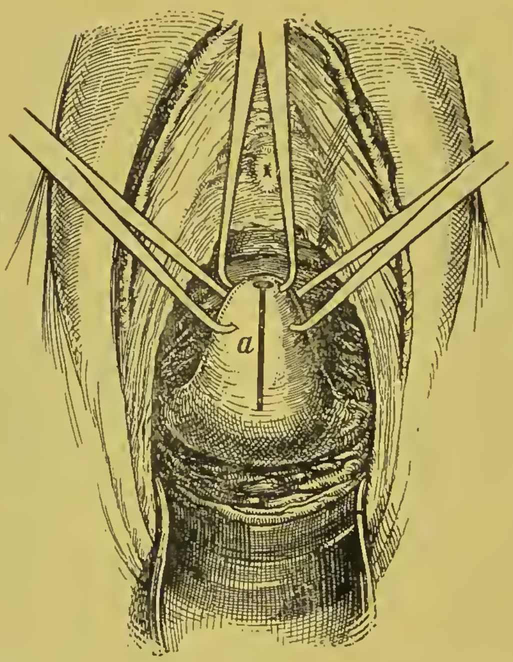


FIG. 176.—Posterior division of the cervix. *a.* Line of incision.

Two sutures, one at each side, are then passed, with the object of drawing the os externum up to the top of the fornix, and of turning the original vertical incision into a transverse one, in the centre of which will be the new os externum. The passage of these sutures is the only troublesome part of the operation. A small curved needle, threaded with silkworm gut, is entered through the covering mucous membrane of the cervix at one side, and as near the top of the incision as possible. It emerges through the mucous membrane of the cervical canal, and is again passed from within outwards through the cervical tissue of the same side, and at the same distance from the tip of the cervix that it was first entered from the vaginal vault (*v.* Fig. 178). A similar suture is then passed through the opposite side of the cervix. If necessary, a second suture may be passed at each side. When the sutures are tied, the os externum is drawn up to the vaginal vault and each raw surface is folded over on itself, so causing its complete disappearance (*v.* Fig. 179). The drawing up of the os externum will widen the angle of flexion between the axes of the cervix

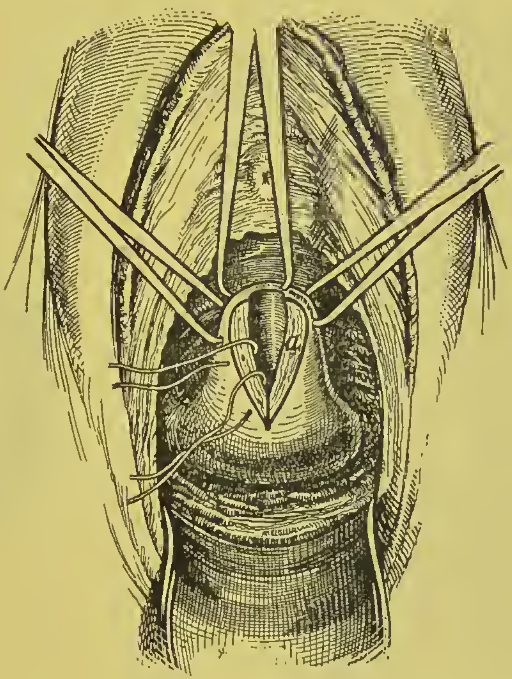


FIG. 177.—Posterior division of the cervix. Result of incision, sutures *in situ* on one side. *a.* Cut edge of posterior lip.

and of the body of the uterus; while the accurate apposition of the raw surfaces to one another will very much facilitate the process of healing, and, by preventing granulation and subsequent contraction of the tissues, will afford a better result than a simple posterior division. The steps and consequence of the operation will be more easily understood by reference to the diagrams.

After-treatment.—The uterus is plugged lightly with iodoform gauze, and also the vagina. Both plugs are removed on the evening of the second day. The patient may be allowed up in from eight to ten days, and the sutures are to be removed on the twenty-first day.

Fig. 178.

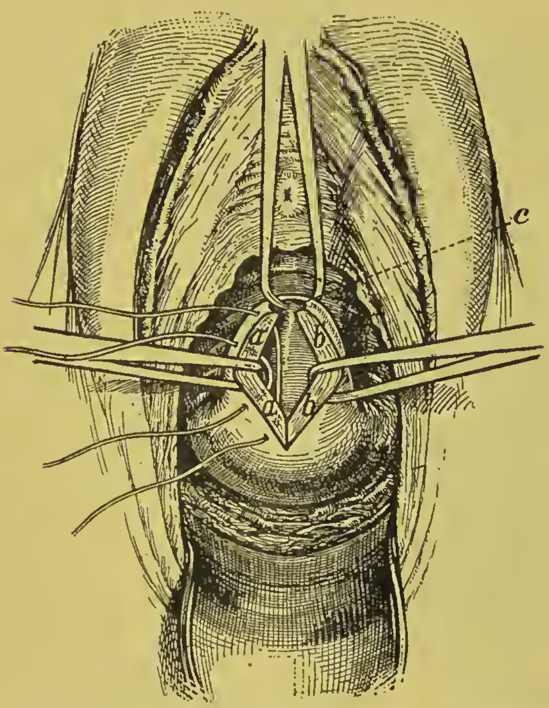


Fig. 179.

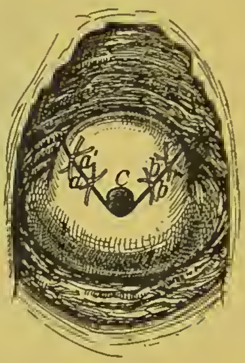


Fig. 178.—Dudley's posterior division. The manner in which the cervix is drawn apart after division, and in which the sutures are inserted. *a, a* and *b, b.* cut surfaces of posterior lip. *c.* Os externum.

Fig. 179.—Dudley's posterior division. The sutures tied. Letters as before.

DILATATION OF THE CERVIX.

Dilatation of the cervix is perhaps the most commonly performed gynæcological operation.

Indications.—Dilatation of the cervix is indicated in two classes of cases:—

(1) As a preliminary to intra-uterine procedures, either diagnostic or curative, in order to obtain sufficient room to pass the necessary instruments through the cervical canal.

(2) As a mode of treatment in stenosis of the cervix.

Instruments.—As will be seen, dilatation of the cervix may be carried out gradually or rapidly. For gradual dilatation, the following instruments are required:—A posterior speculum, two American forceps, a sound, sea-tangle tents, iodoform gauze, and a set of Hegar's dilators. For rapid dilatation, the same instruments are required with the exception of the tents (*v.* Figs. 7, 8, 104).

Operation.—Dilatation of the cervix may be carried out by slowly-acting measures which take several days to bring about the required result—*gradual dilatation*, or by rapid measures which obtain the necessary dilatation in from five minutes to a quarter of an hour—*rapid dilatation.*

Gradual Dilatation.—Gradual dilatation is the method which is indicated, in conjunction with a certain amount of preliminary rapid dilatation, in cases in which dilatation above the size of a No. 8 or No. 10 Hegar's dilator is necessary.

Gradual dilatation can be obtained in three ways, as has already been mentioned (*v.* page 13); they are as follows:—

(1) By the use of sea-tangle tents. This is the most commonly employed method.

(2) By hydrostatic dilators. This form of dilator is rarely used in gynæcological practice.

(3) By the introduction of a succession of firmly applied intra-uterine tampons of iodoform gauze. Each tampon is allowed to remain *in situ* for twenty-four hours, and the process as a rule requires to be performed some six or eight times to obtain the necessary dilatation.

Rapid Dilatation.—Rapid dilatation is accomplished by means of Hegar's graduated dilators. The method of using them will be described below. As a rule, it is not possible to dilate the cervix above the size of a No. 8 or No. 10 Hegar at one sitting without causing laceration of the cervical tissue, but this size is sufficient to permit of curetting being performed.

In order to obtain the maximum amount of dilatation of the cervix, both rapid and gradual dilatation must be resorted to. The method is as follows :—

Commence by dilating the cervix with Hegar's dilators as far as is possible without causing laceration, *i. e.* up to about a No. 8 or No. 10. To do this, pass a posterior speculum, seize the anterior cervical lip in one American forceps and the posterior in another, and draw the uterus down as far as possible. Then, pass the sound into the uterus in order to ascertain the length and the direction of the cavity, and wash the latter out by means of a Bozemann's catheter. Next, push through the inner os the largest sized Hegar's dilator which will pass. This is as a rule about No. 4. Allow it to remain *in situ* for a moment and then withdraw and pass the next largest size, then the next, and so on until it is apparent by the amount of resistance experienced that the passage of a larger dilator would cause a laceration.

As soon as this point is reached, further dilatation by means of Hegar's dilators is given up, and as many sea-tangle tents as the cervix will hold, using small tents in preference to large ones, are passed into the cervix, taking care that they project slightly through the inner os into the uterine cavity. These tents are allowed to remain *in situ* for twenty-four hours, and are then removed. The cervix is again dilated with Hegar's dilators up to No. 23 to 25, and a fresh set of tents is inserted and allowed to remain *in situ* for a further period of twenty-four hours. At the end of this time, the cervix is usually sufficiently dilated for any procedure. If, however, owing to its great rigidity, it is not, a fresh set of tents is again inserted. Each time the tents are inserted, a light tampon of iodoform gauze is placed in the vagina, both with the object of guarding the mucous membrane and to prevent decomposition.

After-treatment.—The patient should always remain in bed for a few days after dilatation has been performed. Beyond this, no special after-treatment is necessary.

CURETTING.

Curetting, curettement, and curettage are the various terms applied to the operation by which the mucous membrane lining the uterus is removed, either for the purpose of diagnosis, or in order to cure some pathological condition.

Indications.—Curetting, as a remedial operation, is indicated in all forms of endometritis, whenever the latter does not rapidly respond to milder treatment. Curetting, as a diagnostic operation, is indicated whenever there is a continuous or often recurring discharge—either hæmorrhagic or purulent—the exact cause of which cannot be discovered by other means.

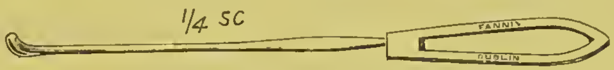


FIG. 180.—Hegar's curette.

Instruments.—The following instruments are required:—Two American forceps; a posterior speculum; Hegar's dilators, or some modification of them; Bozemann's catheter; uterine sound; and at least two curettes, one for the fundus, the other for the sides of the uterus (*v.* Figs. 7, 8, 10, 104, 180—183).

Of the many different forms of curette in use perhaps the most generally useful are Martin's, Hegar's, and Sims' flexible curette (*v.* Figs. 180—183). If a douche curette is required, Rheinstädter's is the most serviceable (*v.* Fig. 183). Martin's curette can be used for both the fundus and sides of the uterus, but it is perhaps most suited for the former. Hegar's curette is most suitable for the sides; it will not curette the fundus. Sims' curette can be made to serve for both purposes by altering the bend of the stem as is required; it will not as a rule remove as large pieces of mucous membrane for macro- or microscopical examination as will Hegar's.

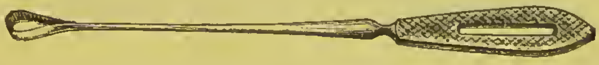


FIG. 181.—Sims' curette.

Operation.—In the majority of cases, before starting to curette, it is necessary to dilate the cervical canal in order to enable the curette to enter (*v.* page 322). Dilatation up to the size of a No. 8 Hegar's dilator will usually be quite sufficient. The proceeding is then carried out as follows :—Expose the 1 cervix by passing a posterior speculum, and, after dilatation, 2 3 introduce whatever curette it is intended to use on the sides of the uterus. The author recommends a Hegar's curette, of the largest size that will pass through the cervix, for this purpose. Pass the curette up to the fundus, which will be recognised by the resistance it offers, and note the length of the uterine cavity. This is always an important preliminary to the operation, as it enables us subsequently to recognise at once if the curette passes through the uterine wall, an accident which is much more common than is generally supposed. The curette is then drawn downwards from the fundus to the inner os, with its cutting edge in contact with the endometrium. It is again passed up to the fundus, and drawn down in a similar manner over the uterine wall with just sufficient change of direction to make it travel over fresh tissue. In this manner, the interior of the uterus is gone over systematically a couple of times, so as to ensure that no spots are left untouched. The curette which it is intended to use on the fundus is then introduced, and for this purpose the author recommends either Martin's or Sims' curette. If the latter is used, the handle must be so bent that the cutting edge is the highest point, as otherwise this edge would not come into contact with the fundus. The fundus is curetted by a lateral movement of the curette from left (the patient's) to right. The knowledge of the exact amount of force with which it is desirable to make the curette press against the mucous membrane, can only be obtained by experience. Speaking generally, the amount of force, which will just cause the uterine muscle-fibre to impart a sensation to the hand as if the curette was travelling over a rough surface, is the correct amount to use.

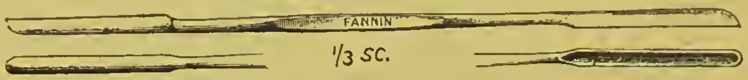


FIG. 182.—Martin's curette.

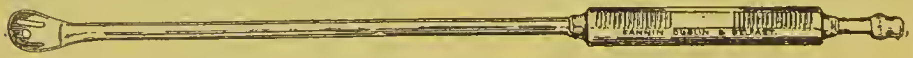


FIG. 183.—Rheinstädter's flushing curette.

As soon as the entire surface of the uterus has been well scraped, the fragments of mucous membrane are washed away with a Bozemann's catheter. A caustic solution, such as chloride of zinc 50 per cent. or iodised phenol,* may be then injected by means of a Braun's syringe (*v.* Fig. 48), while at the same time a continuous stream of water is allowed to flow over the vaginal mucous membrane in order to prevent the caustic from acting upon the latter. The uterus is finally washed out in order to remove any excess of caustic, and plugged tightly with iodoform gauze.

Complications.—With the exception of sepsis, there is no very important complication that can occur except the perforation of the uterus by the sound or curette. The latter accident owes its accompanying risk to the possibility of its permitting or causing the introduction of septic germs into the peritoneal cavity, rather than to any special danger due to the breach of surface of the uterus. Perforation of the uterus in the course of an aseptically carried out operation is of the most trifling importance. Perforation of the uterus when the interior of the latter, or the perforating instrument, is septic will very frequently lead to fatal results.

After-treatment.—The uterine plugging is to be removed on the evening of the following day. The patient ought to remain in bed until all hæmorrhagic discharge has ceased. It is usually advisable to inject the uterus with a caustic solution once or twice during the month succeeding the curetting.

ATMOCAUSIS AND ZESTOCAUSIS.

The term atmocausis, as used in gynæcology, is applied to the cauterisation of the endometrium by superheated steam. The term zestocausis is applied to the cauterisation of the endometrium by means of a metal catheter, which is heated by superheated steam. The use of the caustic effect of superheated steam was introduced in 1886 into gynæcological practice by Snegirew, with the object of providing a method of treating certain cases of uterine hæmorrhage, which did not improve under the ordinary methods of treatment. The original apparatus devised for this purpose by Snegirew has been greatly improved by Pincus, the indications for and contra-indications to its use have been rendered more precise, and the procedure has been converted from one which was somewhat crude and uncertain to one which is commencing to take its place as a recognised gynæcological operation of considerable importance and value. As yet, its adoption is by no means general, but it is more than probable that in the future it will come into more general use. The author regrets that he is unable to write from an experience of the use of the instrument. He draws the following short account from a most interesting review, which appeared in the 'British Gynæcological Journal' for August, 1903, of Pincus' work on the use of high-pressure steam in gynæcology. The operation has been introduced for but a short time, but, as proof that it has been thoroughly tried by gynæcologists who are capable of forming an opinion of its merits, it may be mentioned that it has received the sanction of v. Winckel and Fritsch in Germany, of Macan in Ireland, and of Simpson in Scotland. It has also been successfully adopted by many other Continental and American gynæcologists. In 1899, Pincus was able to collect the records of 833 cases from nearly every quarter of the globe, and of these 749 were returned as either cured or greatly improved.

---

* Iodine one part, carbolic acid (pure) three parts.

The effects of the operation may be divided into two groups:—immediate effects, and remote effects. The immediate effects are as follows:—

(1) Stimulation of the muscle-fibre of the uterus by the heat.
(2) Cauterisation of the mucous membrane and the uterine muscle, by the same agent.
(3) A secondary stimulation of the muscular fibre, due to the absorption of the condensed water.

The remote effects are as follows:—

(1) A powerful and continuous muscular contraction leading to involution.
(2) A profuse discharge which produces a change in the nutrition of the parts and carries away infective germs.
(3) The formation of a wall of granulation tissue beneath the superficial necrosis caused by the steam.

(4) An increased flow of blood to the uterus during the period of reaction.

Indications.—The indications for atmocausis or zestocausis as given by Pincus may be divided into two groups:—absolute indications and relative indications. The absolute indications for atmocausis are as follows:—

(1) Uterine hæmorrhage which is not relieved or cured by the usual measures, and which is associated with or due to the following conditions:—
  (*a*) The preclimacteric period.
  (*b*) Hæmophilia.
  (*c*) Certain cases of myomata in which operation is contra-indicated or impossible, and inoperable cancer of the body of the uterus.
  (*d*) Hæmorrhagic endometritis.
  (*e*) Hæmorrhage the result of subinvolution.
(2) To produce sterility in women with incurable diseases, the course of which is prejudicially affected by pregnancy, such as nephritis, phthisis, and cardiac disease.

The relative indications for atmocausis are as follows:—

(1) Subinvolution which does not yield to treatment.
(2) Cases of metritis in which the use of the curette is indicated, either as an alternative or complementary to the latter.
(3) Certain cases of bacterial infection of the uterus, such as:—
  (*a*) Tuberculosis of the uterus.
  (*b*) Gonorrhœal endometritis.
  (*c*) Septic or saprophytic endometritis.

The absolute indications for zestocausis are as follows:—

(1) When it is desired to cauterise certain circumscribed portions of the endometrium, as the uterine cornua.
(2) Certain cases of dysmenorrhœal endometritis.

The relative indications are as follows:—

(1) When, in a small nulliparous uterus, the use of the curette is indicated for inflammation, we may use the zesto-cautery either instead of or in combination with it.
(2) In cases of obstinate endocervicitis and erosion, a

being a milder application than the thermo-cautery or operative measures.

Contra-indications.—As is only to be expected, certain conditions are laid down as contra-indications to atmocausis or zestocausis. Atmocausis is contra-indicated under the following circumstances:—

(1) If there is a possibility or certainty of the case being one of malignant disease of the uterus.

(2) If there are any inflammatory or painful complications of the adnexa or the parametrium, especially tubal enlargements.

(3) When there is any exacerbation of the symptoms of the patient during menstruation.

If the patient complains of acute pain during the application of the steam, the operation must be at once stopped.

Zestocausis is contra-indicated in all cases in which the uterine walls are thinned and relaxed.

Instruments.—The improved apparatus devised by Pincus consists of the following pieces:—

(1) A boiler of about twenty-one fluid ounces capacity, capable of resisting a pressure of over two and a half atmospheres, and fitted with a thermometer and safety valve.

(2) An intra-uterine catheter somewhat resembling a Bozemann's catheter, with a wooden handle, two-way stopcock, and three end-pieces for use according to the nature of the case. The end-pieces for use in atmocausis are open at the ends to allow the steam to escape into the uterus, those for use in zestocausis are closed at the end. The catheter is connected with the boiler by a stout rubber tube of the necessary length.

(3) A set of short wooden specula, to protect the vaginal walls from the escaping steam.

(4) Two specially made volsellum forceps, with removable handles to enable the speculum to be passed over the forceps after the removal of the handles.

Operation.—The use of an anæsthetic is not only unnecessary but inadvisable. The occurrence of pain is a contra-indication to the continuation of the procedure, and for this reason it is well that the patient should be conscious of what is going on. If the case is a suitable one, the discomfort arising from the use of the steam is very slight. The patient is placed on her back, in the usual position, and the cervix is seized with a forceps and drawn down. The first step of the operation consists in the dilatation of the cervix to the necessary size to allow the fibre-protected catheter to be readily introduced. This dilatation may be effected either by laminaria tents, previously introduced, or by Hegar's dilators. The interior of the uterus is then carefully washed out, and any contained *débris* removed. Previous to this, the boiler has been filled and the necessary head of steam obtained. The amount of water placed in the boiler depends upon the temperature at which it is proposed to use the steam. For temperatures of 100 C. to 105 C. (212° F. to 221° F.), seven ounces of water are poured into the boiler, and for temperatures of 105 C. to 115 C. (221° F. to 239° F.), eleven ounces. The usual temperature at which the steam is used is 110 C.—115 C. If there is hæmorrhage, it is well to use a three per cent. solution of formalin instead of plain water. For ordinary cases, the revolver burner is the best, but for the lower temperatures, or if there is any delay in the operation, the double burner is used, of which only one side need be lighted. If the two-way cock is placed obliquely, no steam can escape from the boiler, and consequently the temperature rapidly rises. The rate at which this occurs can be regulated by the amount of steam which is allowed to escape, and by the kind of burner which is used. The apparatus should stand on a table or on a specially constructed stand.

As soon as everything is ready, the two-way cock is placed transversely, and any condensed water that has collected in the india-rubber tube is expelled. The point of the catheter is now depressed, and the cock turned through a quarter of a circle, the steam then escapes through the catheter, warming the whole apparatus, and clearing out any still remaining water. The cock is now turned back till it is nearly transverse, and, the handle of the instrument being a little depressed, the catheter is quickly introduced into the uterus. As soon as the internal os is completely blocked by the cervix-protector, the cock is slowly turned so as to point along the tube of the catheter. The steam is thus gradually admitted into the uterus, and is allowed to escape for, as a rule, fifteen seconds, commencing to count at the moment the steam begins to escape from the waste steam tube. The catheter should not be allowed to remain in one position in the uterus, but should be moved a little from side to side, so as to avoid the risk of contact necrosis. The fibro cervix-protector must never be so far drawn out as to leave the inner os unprotected, and if steam escapes from the cervix the catheter must be at once withdrawn. The operation should be shortened in proportion to the readiness the uterus shows to contract, the amount of contraction of the uterus being determined by the hand placed on the fundus. Before removing the catheter from the uterus, the steam must be shut off by turning the stop-cock either obliquely or transversely. The catheter should at once be removed should the return tube become stopped, except in cases of bad hæmorrhage, as the stoppage of the tube causes the tension and heat of the steam to rise and thus increases its hæmostatic action. In other cases, the tube should be cleared out thoroughly, the uterus washed out with a one per cent. solution of peroxide of hydrogen, and the catheter again introduced. In estimating the time during which the steam should be allowed to work, we must take into consideration the size of the uterine cavity, the thickness of its walls, and, above all, the contractility of its muscular fibre, the rule being to use the highest possible temperature for the shortest possible time.

To perform zestocausis, a temperature of 115° C. is always necessary. A special end-piece closed at the tip is used, through which the steam can circulate without escaping into the uterus. Its stem is covered with indiarubber tubing which can be slipped up or down in order to expose any desired amount of the tip. The cautery is passed through the cervix as if for atmocausis, and the tip is brought into contact with the uterine wall at whatever point it is desired to cauterise and left there for ten to fifteen seconds. If the patient complains of much pain, the operation must be immediately suspended, and a search made to determine, if possible, the cause.

After-treatment.—After the performance of atmo- or zestocausis, the patient should remain in bed for at least three or four days.

REMOVAL OF SUBMUCOUS MYOMATA.

Under this heading are grouped operations for the removal of pedunculated and sessile submucous myomata, whether growing from the cervix or body of the uterus.

Indications.—The removal of all polypoid submucous myomata, and of all sessile myomata, of whatever size they may be, which protrude sufficiently into the uterine cavity to permit of their being removed without the accompanying removal of the uterus, is indicated as soon as they are recognised, as the longer such tumours are left the larger they grow, and the more difficult their removal becomes.

Instruments.—The following instruments are required:—A posterior speculum, a couple of American forceps, large-sized Hegar's dilators (*v.* Figs. 7, 8, 104), three or four large volsellæ (*v.* Fig. 184), a pair of strong blunt-pointed scissors, an uterine sound, and a Schultze's spoon forceps (*v.* Fig. 185).

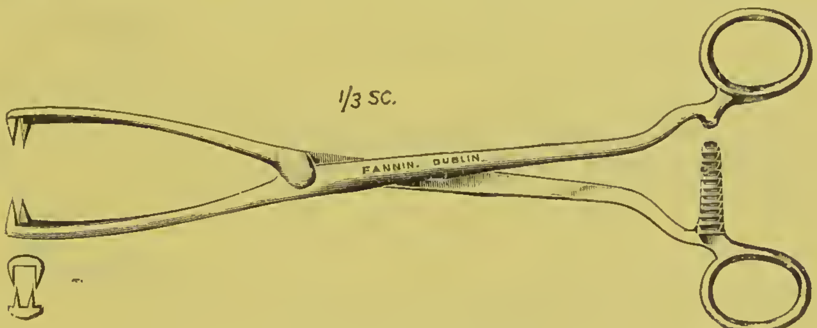


Fig. 184.—Large volsellum with strong teeth, for morcellation.

Operation.—In the case of polypi springing from the cervix, or which have been expelled from the uterus, with a thin pedicle, removal is easily accomplished by taking a firm grip of the tumour with an American forceps or large volsellum and rotating it until the pedicle gives way. If the pedicle is too stout to permit of this, it can be divided by scissors after ligation of it, if it comes from the uterus. If the tumour springs from the cervix, the base of the pedicle can be excised by a wedge-shaped incision, and the edges of the wound, thus caused, brought together by sutures.

If the tumour lies entirely inside the uterus, the cervix must be dilated by means of sea-tangle tents and Hegar's dilators as has been described (*v.* page 322), until the finger can be passed into the uterine cavity. Then, if the tumour is pedunculated, it can be removed by twisting, in one piece if it is not too large to be brought through the cervical canal, or after fragmentation—morcellation—if the reverse is the case. This fragmentation is accomplished by seizing the tumour in two stout volsellæ, one of which is used to steady it, while the portion gripped in the other is cut out with strong scissors. Another piece is then seized with the forceps which has been removed, to be in turn cut out, and so on, until the tumour is sufficiently reduced in size to pass through the cervix.

If the tumour is sessile, but at least half of it protruding into the uterine cavity, it can be removed by means of Schultze's spoon forceps. For this the cervix must be dilated as widely as possible, and then, under guidance of the finger, the forceps is introduced and a portion of the lowest part of the tumour close to its insertion into the uterus is seized and brought away, partly by the cutting action of the blades of the forceps and partly by twisting it out. Another piece is then seized and similarly removed, and so on, keeping at first round the base of the tumour as far as possible. By this means a considerable portion is removed, and the capsule is gradually sufficiently cut through to permit of the remainder of the tumour being brought away *en masse.* In the case of a large myoma, the process can be hastened by seizing pieces in a stout volsellum and cutting them away with scissors or a scalpel.

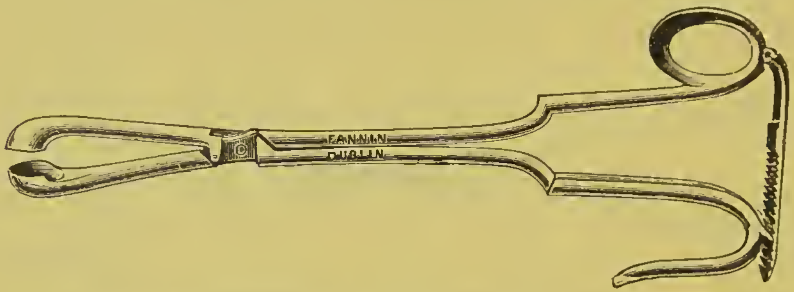


Fig. 185.—Smyly's modification of Schultze's spoon forceps for removing submucous myomata.

When the whole of the tumour has been removed, the uterus is plugged tightly with iodoform gauze. A hypodermic injection of ergot should also be given to promote strong contraction of the uterus.

After-treatment.—The gauze plug is to be removed on the evening of the second, or the morning of the third day. If there is much discharge and the uterus is large, the hypodermic injection of ergot may be continued daily for a week. After the uterus has returned to its normal size it is frequently advisable to curette the cavity, in order to cure the endometritis which is almost always associated with a myoma.

Complications.—Two serious complications may occur during the removal of a sessile myoma :—an extensive opening may be made into the peritoneal cavity through the base of the tumour; and, in the case of a myoma springing from the fundus of an inverted uterus, a portion of the uterus may be removed. In the former case, if the opening is not very large and there is no extreme hæmorrhage, it will probably be sufficient to plug the uterus with iodoform gauze in the ordinary manner. The patient must be carefully watched, as, if intra-peritoneal hæmorrhage occurs it will be necessary to remove the uterus, or at any rate to perform a ventral cœliotomy, in order to suture the opening. In the case of the removal of part of an inverted uterus, vaginal hysterectomy is the most suitable treatment.

CURETTING AND CAUTERISATION OF IRREMOVABLE MALIGNANT DISEASE.

The most suitable treatment for those cases of malignant disease of the uterus or vagina which are too advanced for radical treatment, is that introduced by Marion Sims.

Indications.—All cases of inoperable malignant disease accompanied by hæmorrhage or fœtid discharge, in which the extent of the growth is not so great as to render it impossible to carry out the treatment without opening into the peritoneal cavity, bladder, or rectum.

Instruments.—The following instruments are required :—A large posterior speculum; three vaginal retractors of vulcanite or some other non-conducting substance; a large sharp curette; a thermo-cautery; plugs of cotton wool soaked in a 50 per cent. solution of chloride of zinc, and dried as far as possible; plugs soaked in a saturated solution of bicarbonate of soda.

Operation.—The first step consists in carefully determining, by means of a bimanual recto-vaginal examination, and by passing a sound into the bladder, the extent of the growth and its relationship with the rectum and bladder. The site of the malignant disease—which is most usually the cervix—is then exposed, and as much of the growth as can be safely removed is torn away with the curette. The cavity thus formed is next cauterised thoroughly with the thermo-cautery—using a large-sized platinum point at a cherry-red heat—until the hæmorrhage which resulted from the curetting is almost stopped. The cavity is then dried as thoroughly as possible with plugs of cotton wool, and while dry is filled with small plugs of the same material soaked in a 50 per cent. solution of chloride of zinc. These plugs should be prepared overnight, and so given time to dry. The plugs are only allowed to fill the cavity, and must not come into contact with the vaginal mucous membrane. The last step consists in filling the vagina with plugs soaked in a saturated solution of bicarbonate of soda, in order to decompose any chloride of zinc which may trickle down.

Complications.—The complications which may occur, are due to the too extensive action of the caustic. In this way, openings may be formed into the bladder or rectum, or, if the caustic has been introduced into the uterine cavity, into the peritoneal cavity. Such accidents are of course irremediable, owing to the general condition of the surrounding structures.

After-treatment.—The plugs are removed on the fifth day, unless it is only desired to produce a superficial effect in consequence of the small amount of tissue lying between them and neighbouring organs, in which case they are removed on the first or second day. As a rule, there will be a profuse fœtid discharge for several days, until the slough caused by the caustic separates. To check this discharge, vaginal douches of creolin, lysol, or permanganate of potash, may be given twice daily.

REPOSITION OF AN ADHERENT RETRO-DEVIATED UTERUS.

A retro-deviated adherent uterus can best be replaced by Schultze's method.

Indications.—In the case of a retroverted adherent uterus, an attempt should be made to break down the adhesions by Schultze's method. If this fails, it may then be necessary to discuss the advisability of adopting other treatment.

Instruments.—The only instrument required is an American forceps (*v.* Fig. 7).

Operation.—With the patient under an anæsthetic empty the bladder, and fill the rectum with water. The latter will be most easily done by means of a glass nozzle attached to an ordinary douche can, which is sufficiently raised to give the necessary head of water. The index finger of the right hand is then introduced into the vagina, and the middle finger into the rectum, and between them the uterus is raised upwards towards the abdominal wall, carrying with it the adherent rectum. The left hand then depresses the abdominal wall, as if it was trying to push the latter down between the uterus and rectum, and with a to-and-fro lateral movement of the fingers, an attempt is made to wipe off the adhesions, using the abdominal wall in a manner somewhat similar to that in which a sponge is used to separate adhesions in the course of a cœliotomy. If the adhesions are sufficiently soft to be broken down in this manner, they will be felt tearing away under the fingers, and gradually, as they all part, the uterus will be able to be drawn forwards. In some cases, it will be found of service to draw the uterus down with an American forceps on the cervix. The last step consists in inserting a properly fitting pessary to keep the uterus in its correct position.

Complications.—It seems at first sight as if this operation would frequently result in damage to the intestines. Such, however, is not the case, unless an entirely unjustifiable amount of force is used, or unless the nature of the case has not been correctly diagnosed. An accident which may sometimes happen, is the formation of a small hæmatocele, owing to the rupture of a vessel in one of the adhesions. This is not a serious accident, however, as the blood will be quickly absorbed. Schultze's method should never be adopted in the presence of cystic conditions of the tubes or ovaries.

CHAPTER XXI.

MAJOR OPERATIONS ON THE UTERUS.

Hysterectomy: Ventral Hysterectomy—Indications—Instruments—Operations: Partial Hysterectomy; Schroeder's Operation, Kelly's Operation: Total Hysterectomy; Doyen's Operation, Werder's Operation—Complications—After-treatment. Vaginal Hysterectomy—Indications—Instruments—Operations: Without Mutilation of Uterus; Suture Operation, Clamp Operation: With Mutilation of Uterus; By Median Incision, By Morcellation—Complications—After-treatment. Myomectomy and Enucleation—Indications—Instruments—Operation; Myomectomy, Enucleation—After-treatment. Hysteropexy—Indications—Instruments—Operations; Ventral; Vaginal, Mackenrodt's Operation, Dührssen's Operation—After-treatment. Radical Cure of Inversion—Indications—Instruments—Operation—After-treatment.

HYSTERECTOMY.

The term hysterectomy (*ὑστέρα*, the womb; *ἐκτομή*, a cutting out), which correctly should be applied only to the entire extirpation of the uterus, has come to be applied to all operations for the removal of the body or of the whole of the uterus, with or without the accompanying removal of the tubes and ovaries. The following table shows the various forms of hysterectomy which are performed:—

Hysterectomy	Ventral	Partial.
		Total.
	Vaginal (always total)	Without mutilation of uterus.
		With mutilation of uterus.

VENTRAL HYSTERECTOMY.

Ventral hysterectomy is the term applied to the removal of the body of the uterus, or of the entire uterus through an incision in the abdominal wall.

Indications.—Abdominal hysterectomy is indicated under the following conditions :—

(1) A myomatous uterus which is too large to be removed by vaginal cœliotomy.
(2) Malignant disease of the uterus, except in its very early stages.
(3) Certain cases of inflammatory conditions of the adnexa.

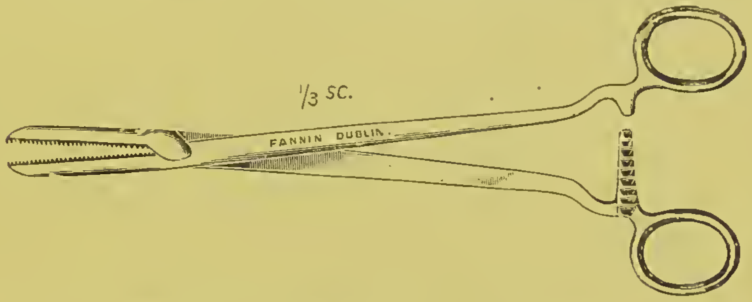


Fig. 186.—Péan-Segond compression forceps, for vaginal hysterectomy.

Instruments.—The following instruments are required in addition to those given under the head of Ventral Cœliotomy (*v.* page 236) :—Five or six clamp forceps of various shapes and curvatures (*v.* Figs. 111, 186) ; Doyen's crotchet for extracting the cervix from the vagina (*v.* Fig. 194) ; narrow double-bladed knife for dissecting out mucous membrane of cervical canal ; some form of corkscrew myoma extractor—*e. g.* Doyen's (*v.* Fig. 187).

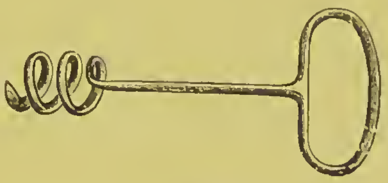


Fig. 187.—Doyen's corkscrew myoma extractor.

Operations.—Ventral hysterectomy may be :—

I. Partial.
II. Total.

I. Partial Ventral Hysterectomy.—Partial ventral hysterectomy, or supra-vaginal amputation of the uterus, is the term applied to the removal of the body and of that part of the cervix which lies above the vaginal insertion, while the remainder of the cervix is left behind. The advantage of this operation over total hysterectomy is that it requires a shorter time for its performance, while the main objection which is urged against it, is, that in leaving the cervix a possible source of subsequent infection is left behind. The improved technique of the operation has however to a great extent, or altogether, removed this objection, so that it is now in quite as established a position as is total ventral hysterectomy. There are two chief methods of performing the operation :—

(A) Schroeder's operation.
(B) Kelly's operation.

(A) **Schroeder's Operation.**—Schroeder's operation cannot be regarded as the most suitable or the most rapid method of performing hysterectomy, but, in certain cases, where the mode of growth of the myoma renders such procedures as Kelly's hysterectomy difficult, it may have to be adopted, and for this reason we think it well to describe it.

The steps of the operation are as follows :—

(1) The abdomen is opened in the middle line and the uterus is drawn out through the wound.

(2) The ovarian vessels and the round ligament on one side are tied, and the broad ligament divided. A third suture is inserted nearer the uterus if necessary in order to control hæmorrhage from large veins which sometimes run down beside the uterus.

(3) The ovarian vessels, etc., of the other side are similarly treated, and the corresponding broad ligament divided.

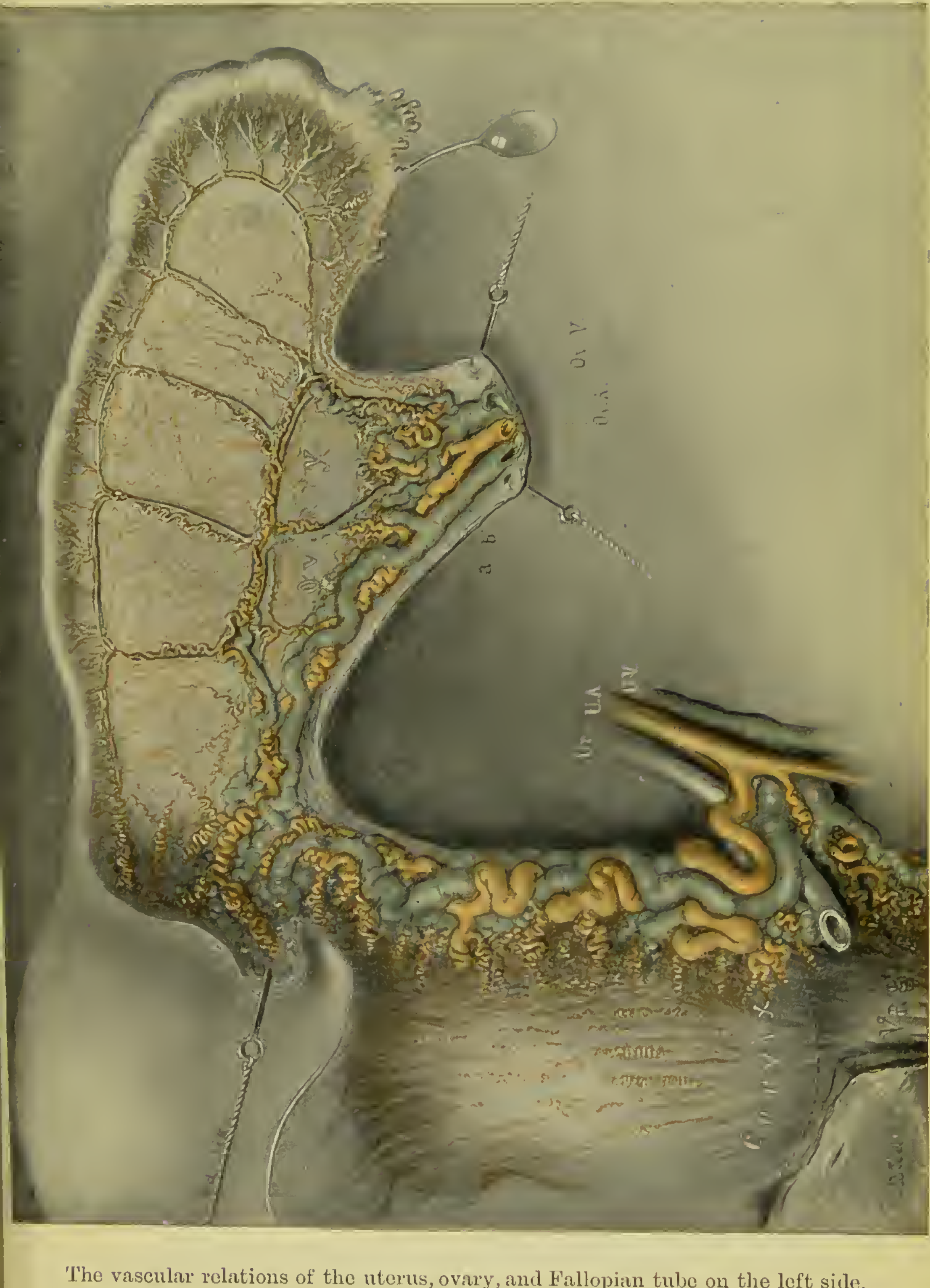
(4) An incision is made through the peritoneum covering the face of the uterus, and connecting the incisions which divide the broad ligaments, and the bladder is pushed downwards off the uterus.

(5) A similar incision is made across the posterior surface of the uterus.

(6) The uterine vessels are ligated on each side and divided.

(7) The cervix thus isolated is cut across just above the vaginal insertion, and the uterus removed. The mucous membrane of the cervical canal is dissected out, and the resultant opening closed by suturing.

(8) The divided edge of the anterior reflection of peritoneum is sutured to the opposite edge of the posterior reflection, in such a manner as to cover over the cut edges of the broad ligaments and the cervical stump.



The vascular relations of the uterus, ovary, and Fallopian tube on the left side, as seen from the front. The anterior leaf of peritoneum has been removed. The relations of the ureter to the uterine artery are well seen. *Ur.* Ureter. *U.A.* Uterine artery. *U.V.* Uterine vein. *Ov.A.* Ovarian artery. *Ov.V.* Ovarian vein.

(9) The abdomen is closed.

The operation is performed as follows:—The patient is placed in Trendelenburg's position, and the abdomen opened in the usual manner—the incision being long enough to permit of the uterus being delivered through it. If possible, the uterus is drawn out of the abdomen, and then pulled over towards the right side by an assistant. The ovarian vessels are then ligated, either at the pelvic-infundibulo ligament, or between the ovary and the uterus, according as we desire to remove or to leave the ovary. The round ligament is then tied, and that portion of the broad ligament which is controlled by these sutures is divided, bleeding from the distal ends of the cut vessels being checked by the application of a clamp forceps (*v.* Fig. 188). If required, an additional ligature is placed on the broad ligament so as to ligate the large veins which run down at the side of the uterus (*v.* Figs. 188, 189). The uterus

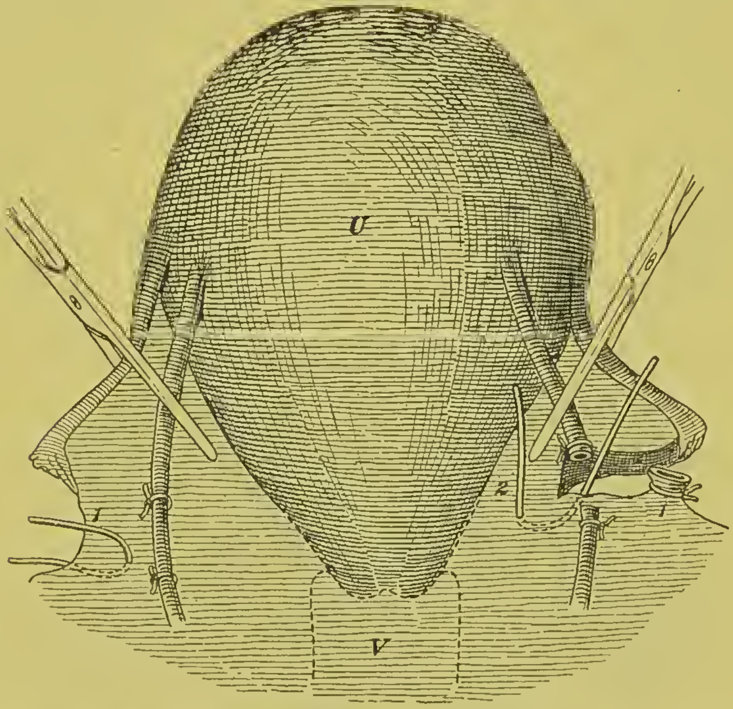


Fig. 188.—Schroeder's partial hysterectomy. U. Uterus. V. Vagina. This and the two succeeding figures represent diagrammatically the various stages, each side of the uterus—reading from left to right—showing the operation a little more advanced. 1. (On right) ligature on ovarian vessels in position. 1. (On left) same ligature tied and infundibulo-pelvic ligament divided. 2. Second ligature on broad ligament in position.

is then drawn over to the left, and the vessels and right broad ligament ligated in a similar manner.

A transverse incision is next made through the peritoneum covering the anterior face of the uterus, connecting the incisions in the broad ligament, and a little above the fundus of the bladder (*v.* Fig. 189, A); and the peritoneum below this incision is pushed down as far as it will go, carrying with it the bladder (*v.* Fig. 190). A similar incision is next made across the posterior face of the uterus, and the peritoneum pushed downwards from off the latter. The uterine vessels on both sides can now be felt pulsating against the side of the uterus. They are isolated as far as possible—by pushing down any loose connective tissue which lies round them, and then tied, taking care to keep as close to the uterus as possible to avoid any risk of including the ureter in the ligature. The uterine vessels are next divided, and the cervix cut across above the level of the vaginal insertion (Fig. 190, C). The upper half of, or if possible

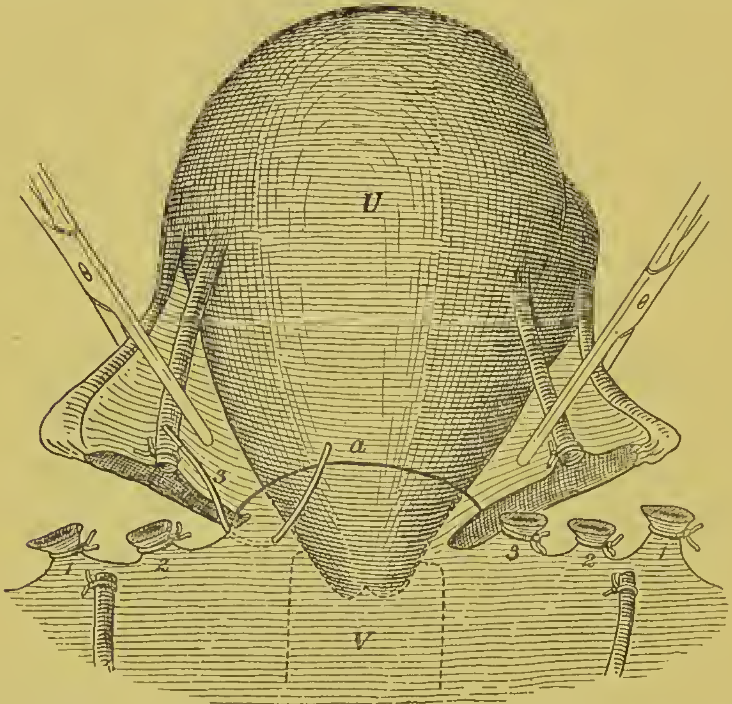


FIG. 189.—Schroeder's partial hysterectomy. Ligature 2 tied and ligament cut. Ligature 3 (on right) in position. Ligature 3 (on left) tied. *a.* Incision through peritoneum above bladder connecting the ends of incisions in the broad ligament.

the entire cervical canal is then dissected out from above with a sharp-pointed double-edged knife, and the resultant cavity is obliterated by bringing its walls together with a continuous catgut suture. Finally the anterior and posterior peritoneal flaps are brought together, also with a continuous catgut suture, so as to cover over the stump and all raw surfaces.

Another method of dealing with the cervical canal consists in first destroying the mucous membrane by cauterising it with a Paquelin's thermo-cautery, and then excising the cervical canal as described.

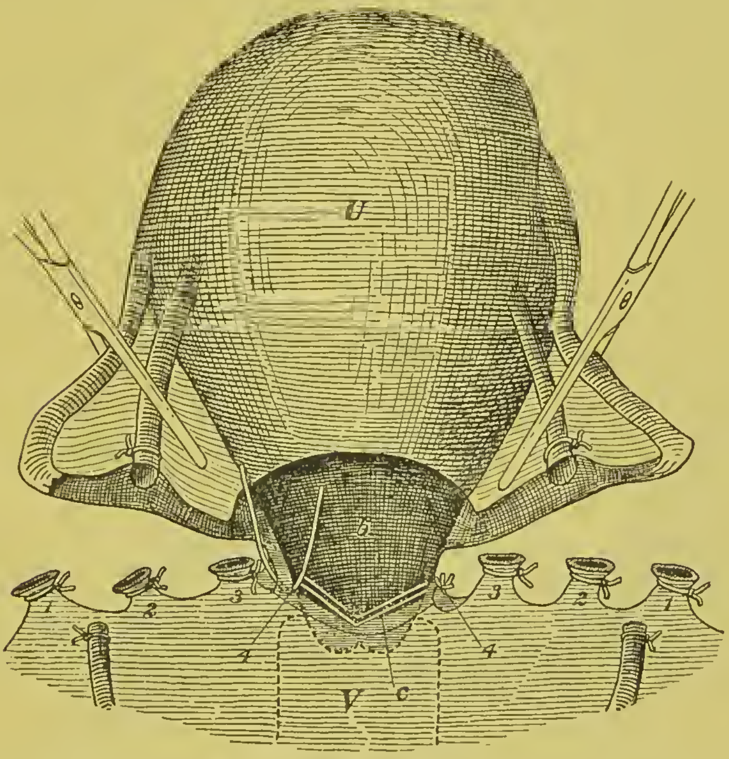


Fig. 190.—Ligatures 1, 2, 3 tied, and the broad ligament divided. *b*. Lower portion of uterus from which the peritoneum has been stripped. Suture 4 (on right) surrounding the uterine artery. Suture 4 (on left) tied and artery divided. *c*. Incision through cervix by which the uterus is cut away.

(B) **Kelly's Operation.**—Kelly's operation of hystero-myomectomy, as he terms it, differs from the foregoing in that the operator removes the uterus as soon as the vessels on one side are ligated, leaving the other side to be tied subsequently. The various steps are as follows (Kelly):—

(1) Preliminary preparation of the field including the skin and vagina.

(2) Opening the abdomen. The patient is then placed in Trendelenburg's position.

(3) Delivering the tumour if possible.

(4) Ligation of the ovarian vessels and the round ligament of one side, usually the left, and opening the top of the broad ligament.

(5) Detachment of the vesico-uterine fold of peritoneum from side to side, and pushing it well down so as to separate the bladder from the cervix.

(6) Ligation of the uterine vessels of the same side.

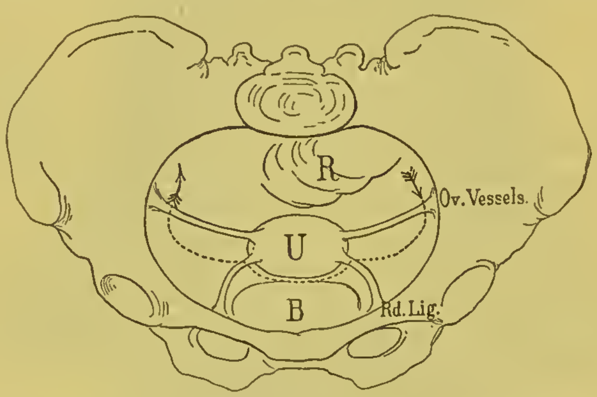


FIG. 191.—Kelly's hystero-myomectomy. Diagram showing the line of incision, beginning with the left ovarian vessels and ending with the right.

(7) The amputation of the uterus in the cervical portion leaving a cup-shaped pedicle.

(8) Clamping the uterine artery of the opposite side, clamping the round ligament, and clamping the ovarian vessels, followed by the removal of the tumours.

(9) Application of ligatures in the place of forceps.

(10) Suturing the cervical stump.

(11) Covering the wound area with peritoneum.

(12) Cleansing the peritoneal cavity.

(13) Closure of the abdominal incision without a drain.

The first four steps of this operation are, as will be seen. identical with the preliminary steps of Schroeder's operation, The essential difference then appears, as instead of proceeding to ligate the vessels of the opposite broad ligament, the next step consists in incising the peritoneum, which covers the anterior face of the uterus, and in displacing the peritoneum and bladder downwards. This brings into view the uterine vessels of that side, and they may be brought into still greater prominence by dividing with the scissors the sharp edge of the peritoneum covering the posterior face of the uterus as in the former operation. The vessels are then ligated with a silk ligature and divided, any vessels which may have escaped from the first ligature being caught with a forceps and separately tied.

The next step consists in amputating the uterus through the

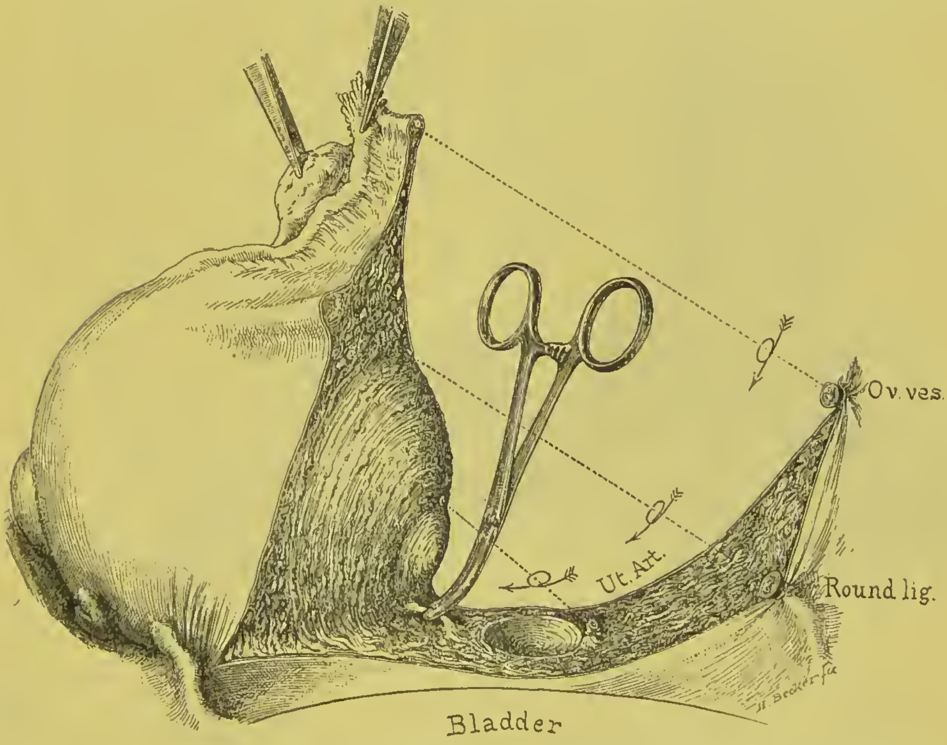


Fig. 192.—Kelly's hystero-myomectomy. Showing the manner in which the uterus is detached from left to right (Kelly).

cervix. This should be done in such a manner as to leave a cup-shaped depression in the stump, in order to permit of its subsequent more easy closure by sutures. A little mucus as a rule escapes from the cervical canal as it is divided, and this should be carefully wiped away. Any vessels that bleed in the stump may be temporarily controlled by clip forceps. As soon as the cervix is divided, the uterine vessels of the opposite side appear and are caught in a clamp (*v.* Fig. 192). Kelly recommends not to clamp them at the level of the divided cervix, but to roll the uterus still further over to the left, until the separation between the cut surfaces amounts to several centimetres, and then to clamp the vessels at this higher level, as by this means the subsequent ligature is tied at a greater distance from the ureter than would otherwise be the case. As soon as the uterine vessels have been clamped and divided, the uterus is rolled still further outwards (*v.* Fig. 193), and the right broad ligament, which now alone holds it, is secured with two clamps—one on the broad ligament and the second on the ovarian vessels, and divided.

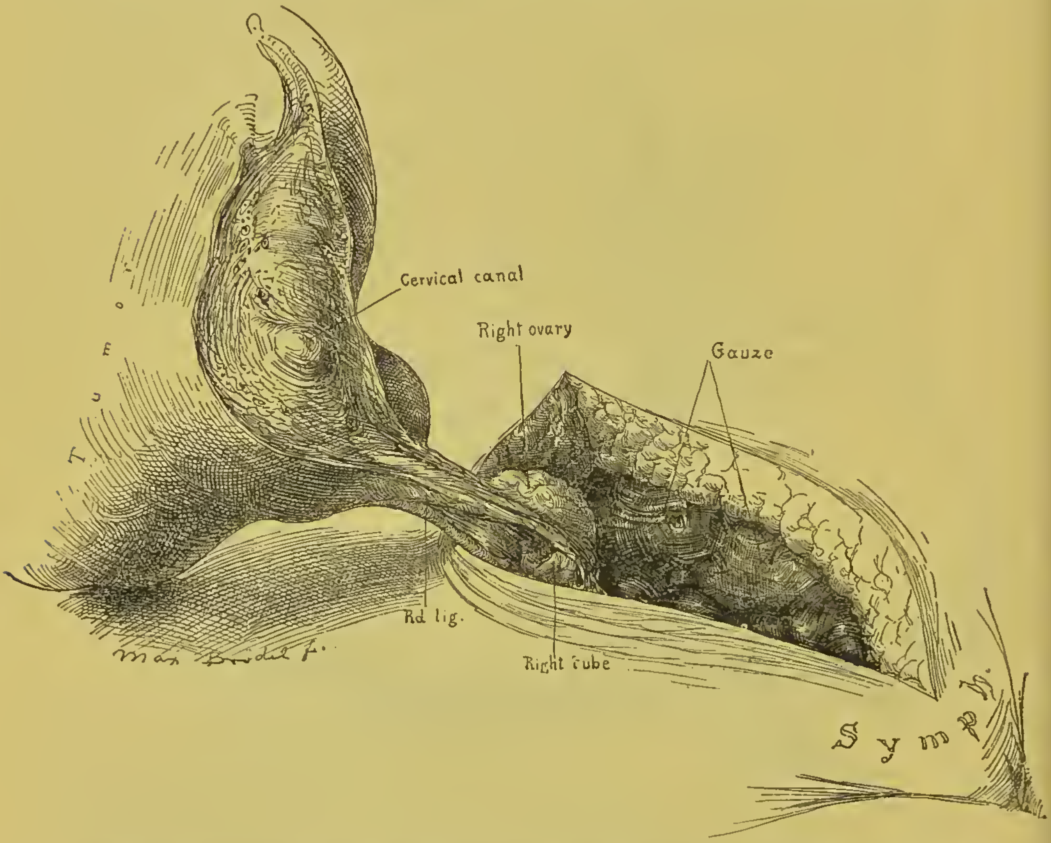


Fig. 193.—Kelly's hystero-myomectomy. The uterus has been rolled out of the abdomen, and is attached only by the right round ligament, ovary, and tube.

As soon as the uterus is removed, the clamps which are on the right-hand uterine artery and vessels of the broad ligaments are replaced by ligatures. The uterine artery is the first to be tied, and, to render it more accessible, the stump of the cervix is seized with an American forceps and drawn upwards. The vessel is then picked up in an artery forceps and tied. The other vessels are then similarly treated, the clamps are removed, and any bleeding point is ligated. As soon as this is done, any bleeding points in the cervical stump are picked up and tied, or included in a suture passed into the cervical tissue. The cup-shaped cavity in the stump is then closed by from three to five catgut sutures passed from before backwards and tied separately. If there is any evidence of infection of the cervical canal, the latter should be dissected out, or this course may be adopted as a routine practice in all cases.

The final step of the operation consists in suturing together the anterior and posterior flaps of peritoneum in such a manner as to cover over the divided edges of broad ligament and the cervical stump as in Schroeder's operation. This is done with a continuous catgut suture which commences at one pelvic-infundibulo ligament and travels transversely across the pelvis to the opposite.

II. TOTAL VENTRAL HYSTERECTOMY.—Total ventral hysterectomy is the term applied to the removal of the entire uterus. It is always indicated instead of partial hysterectomy in the following cases:—malignant disease of the uterus; sloughing or decomposition inside the uterus; suppurative affections of the adnexa; and any case in which it is of importance to have an opening into the vagina for drainage. It is usually performed by Doyen's method.

Doyen's Operation.—The essential feature of Doyen's operation is that the uterus is removed before any ligatures are applied. It is the most rapid method of removing a myomatous uterus in a suitable case. The steps of the operation are as follows:—

(1) The patient is placed in Trendelenburg's position, the abdomen is opened, and the uterus drawn out into the wound.

(2) The posterior vaginal fornix is perforated by a scalpel cutting on to a curved forceps pushed upwards through the vagina.

(3) The opening is enlarged, and the cervix is seized in Doyen's crotchet (*v.* Fig. 194) or with an American forceps and drawn upwards into the peritoneal cavity.

(4) With two cuts of a scissors, the lateral attachments of the cervix to the vagina are divided. This allows the cervix to be

pulled up still higher, and the anterior lip to be seized in the crotchet—if this was not done previously.

(5) The mucous membrane of the anterior fornix is divided, and the cervix, pulled still further upwards, quickly detaches itself from the bladder from below upwards.

(6) The broad ligaments on either side are clamped and divided, and the tumour, thus set free, is removed.

(7) The uterine and ovarian vessels are picked up separately and tied, the clamps are removed, and any further vessels that bleed are tied.

(8) The vaginal opening is closed by a few sutures, and finally the peritoneal flaps are drawn together by a purse-string suture so placed as to cover over the divided stumps of the ligaments and the vaginal opening.

The operation is performed as follows:—As soon as the abdomen is opened, the uterus is drawn out into the wound, a corkscrew extractor (*v.* Fig. 187) is screwed into it, and an assistant pulls it down forcibly over the pubes in such a manner as to expose Douglas' pouch to the fullest extent (*v.* Fig. 195). A long curved forceps is then pased into the posterior fornix of the vagina, and pushed upwards against the mucous membrane in such a manner as to indicate its position beneath the peritoneum of Douglas' pouch. An opening is next made into the vagina by cutting down on the forceps with a scalpel, the forceps is pushed through into the peritoneal cavity, and the opening enlarged by separating the blades. A suture is then passed through the peritoneum and the vaginal mucous membrane just below this opening, and tied, with the object of providing a tractor for subsequent use to draw the posterior edge of the vaginal opening into view after the removal of the uterus. The finger of the operator is then passed into the vagina, and under

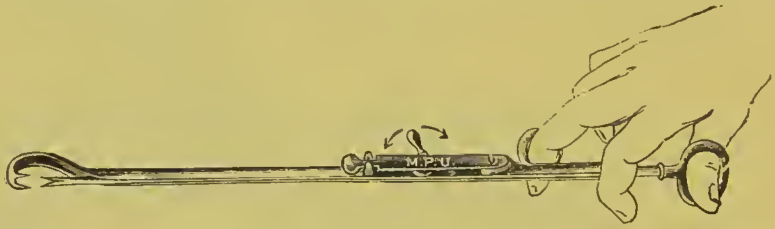


Fig. 194.—Doyen's crotchet extractor, for drawing the cervix upwards through the opening in the posterior fornix in complete hysterectomy.

its guidance the posterior, or if possible the anterior lip of the cervix is seized either in an American forceps or in Doyen's special crotchet extractor, and drawn forcibly upwards through the opening (*v.* Fig. 196). This procedure is facilitated by making a vertical incision through the peritoneum covering the posterior aspect of the uterus immediately above the opening in the vaginal vault, as this provides additional room for the cervix. The anterior lip of the cervix can then be caught in a forceps, if this has not been previously possible. The mucous membrane of the lateral fornices of the vagina and the lateral attachments of the uterus to the vagina are then divided with a scissors curved on the flat. This permits the

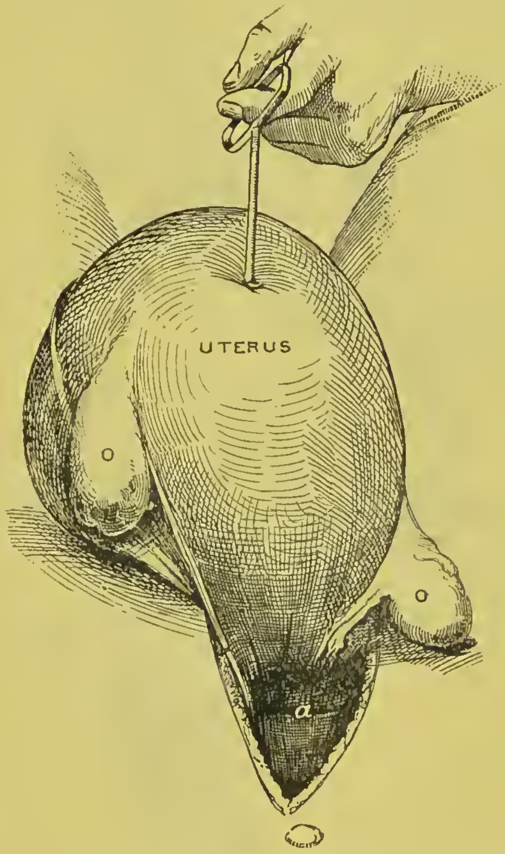


Fig. 195.—Doyen's hysterectomy. The patient is in Trendelenburg's position, and the uterus is drawn out of the abdomen and downwards over the pubes, so as to expose the floor of Douglas' pouch. *a*. Incision opening into the posterior vaginal fornix. o. Ovary. (This and the succeeding drawings were made from stereoscopic photographs by Dr. C. A. Ball of an operation performed by Dr. W. J. Smyly.)

cervix to be drawn still further upwards and brings into view the mucous membrane of the anterior vaginal fornix, which is divided in turn, taking care to keep as close to the cervix as possible. By pushing upwards with the finger, the connective tissue between the bladder and the uterus is then opened up, and by dragging the cervix forcibly upwards with the forceps, the bladder is completely separated from the cervix (*v.* Fig. 197). This separation is assisted with the finger passed upwards from the vaginal opening, and is carried out laterally towards the broad ligaments at either side in such a manner as to detach a large flap of peritoneum. The tip of the finger is then passed through the peritoneum, and the opening thus made is extended across the face of the uterus. By this procedure, the uterus has been completely freed from its posterior and anterior attachments, and is now connected with the pelvis by the broad ligaments alone.

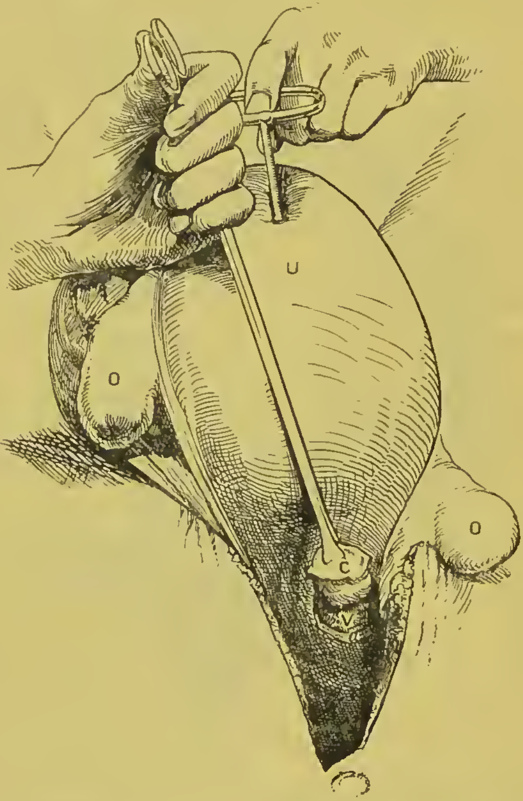


FIG. 196.—Doyen's hysterectomy. The cervix has been seized in an American forceps and drawn out through the opening in the floor of Douglas' pouch. C. Cervix. V. Mucous membrane of anterior vaginal wall.

The next step consists in clamping the right broad ligament with a clamp applied between the ovary and the uterus, and in cutting through the ligament (*v.* Fig. 198). The uterus is then drawn over to the left side, the left broad ligament is similarly clamped and divided, and the uterus is removed. In each case, the line of division should be kept so close to the uterus as to shave the uterine tissue, as by this means it will often be found that not the main trunks of the vessels but their smaller branches are cut. Two clamps will be required on each side, one on the uterine vessels, and the other on the ovarian vessels and the round ligament.

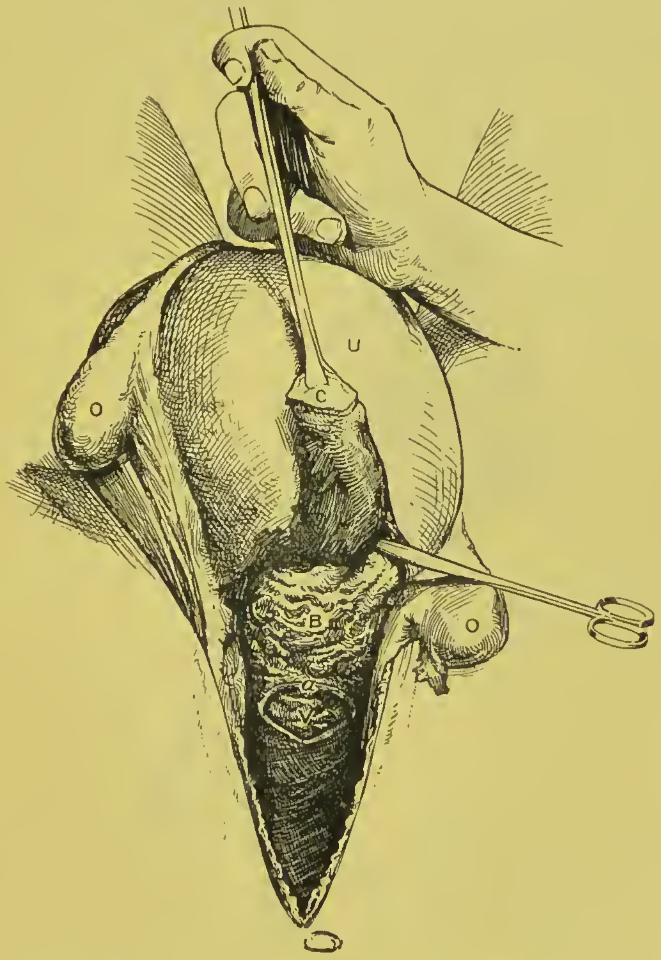


FIG. 197.—Doyen's hysterectomy. The cervix has been drawn further up, and is detached from the bladder. B. Bladder wall. *a*. Cut edge of opening into vagina.

The uterus being now removed, the next step consists in replacing the clamps by ligatures, and in removing the appendages if it is so desired. In simple cases, two sutures on each side are sufficient. One of these is passed through the broad ligament and tied inside the ovary, while the second is placed on the uterine vessels. The vessels should however be picked up and tied separately, and, consequently, if its branches are divided several sutures may be required. The clamps are then removed one by one, and any vessels that have escaped ligation previously are picked up and ligated. Small vessels will frequently be found in the parametric tissue between the peritoneum and the vaginal mucous membrane.

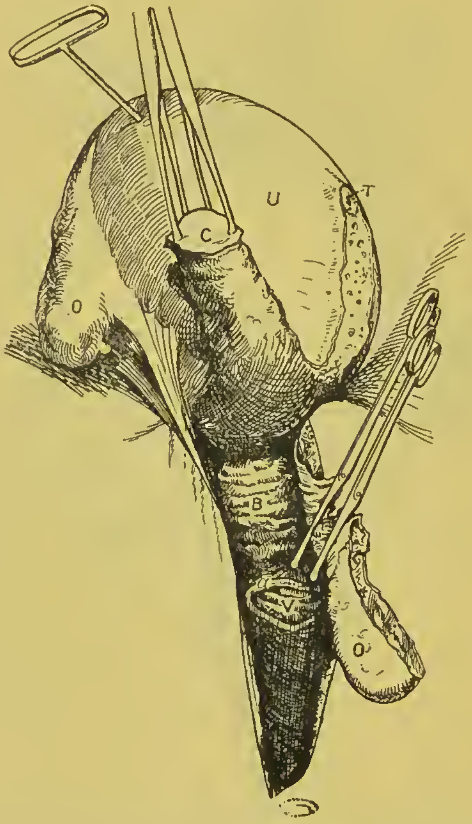


Fig. 198.—Doyen's hysterectomy. The uterus has been drawn over to the left side, and the right broad ligament clamped and divided. T. Cut end of Fallopian tube.

As soon as all bleeding points have been tied, the posterior edge of the vaginal opening is drawn into view by means of the silk ligature which was passed through it at the commencement of the operation, and the vaginal mucous membrane surrounding the wound is caught with forceps in two or three places and brought into view. Its edges are then brought together with a continuous catgut suture and the opening thus closed. The final step consists in bringing together the divided edges of peritoneum in such a manner as to completely cover the divided ligaments and vaginal opening (*v.* Fig. 199). For this purpose, Doyen recommends a purse-string suture of catgut. This is introduced through the left tubo-ovarian

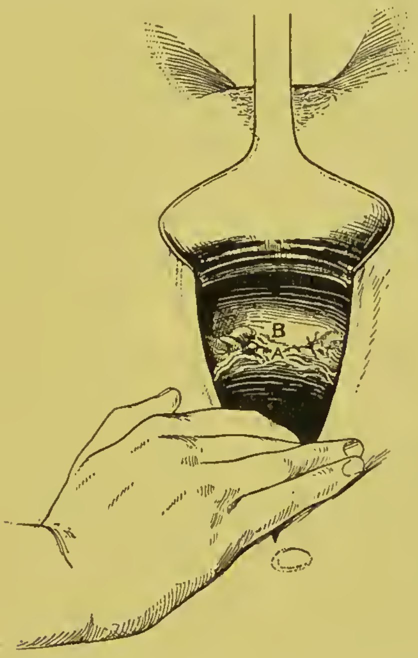


Fig. 199.—Doyen's hysterectomy. The uterus has been removed, and the anterior and posterior flaps of peritoneum brought together by a catgut suture. B. Peritoneum covering bladder. A. Peritoneum drawn up from floor of Douglas' pouch.

pedicle, and then passed successively through the posterior flap of peritoneum, the right tubo-ovarian pedicle, and the anterior flap of peritoneum. The free end of catgut which was left at the left tubo-ovarian pedicle is then again passed through the eye of the needle and brought from left to right through the anterior flap of peritoneum to meet the other end. The two ends are then tied tightly with a double knot. If the peritoneal flaps are not of sufficient size to allow of their being brought together in this manner, they must be brought together transversely by means of a continuous suture as in Kelly's operation.

The above short description of Doyen's operation briefly outlines the method in which it is performed in favourable cases, when the size or the situation of the myoma is not such as to prevent the uterus from being drawn out of the abdomen, and when Douglas' pouch can be exposed. In certain cases, however, the shortness of the broad ligaments or the presence of large myomata in Douglas' pouch may render modifications of the operation necessary. If the broad ligaments are too short, the first step of the operation must consist in dividing them in order to allow the uterus to be drawn upwards. If large myomata are found in Douglas' pouch, which prevent access to the posterior vaginal fornix, Doyen recommends their preliminary enucleation, and in exceptional circumstances the opening of the vagina through the lateral fornix. It is impossible here to do more than mention the occurrence of such cases, and to refer the reader for particulars to Doyen's published works on the subject.

Werder's Operation.—Werder's operation differs from the foregoing operations in that, although all the necessary steps for the detachment of the uterus from the surrounding parts and the ligation of vessels are performed by the abdominal route, the uterus is finally removed *per vaginam.* It might on this account be included under the head of vaginal hysterectomy, but as by far the greater part of the operation is performed from above, we prefer to describe it here.

The advantages of Werder's operation are that it permits the free removal of the greater part of the vaginal mucous membrane in addition to the entire uterus, and that it enables this to be done without opening into the vagina from above, and consequently diminishes the risk of carrying septic or malignant infection from the vagina into the peritoneal cavity. On this account, it is of value in cases of malignant disease of the cervix which has extended on to the vaginal mucous membrane.

The steps of the operation are as follows:—

(1) All broken down malignant tissue is curetted away from the cervix. If possible, this step is done a few days before the day fixed for the removal of the uterus.

(2) Bougies aro inserted into the ureters, if desired, in order to clearly define their position.

(3) The abdomen is opened, and the ovarian vessels and round ligaments are ligated.

(4) The bladder is separated from the uterus and the broad ligaments.

(5) The base of the broad ligaments is thus opened up, and the uterine vessels and the ureters are located. The former are tied as close to their point of origin as possible.

(6) The bladder is separated from the anterior vaginal wall as far downwards as is desired.

(7) The floor of Douglas' pouch and the anterior wall of the rectum are similarly freed from the posterior vaginal wall.

(8) The lateral fornices of the vagina are freed from the base of the broad ligaments, and are separated downwards from the subjacent connective tissue.

(9) The uterus is then pushed downwards through the vaginal orifice, and the anterior and posterior flaps of peritoneum are sutured together above it.

(10) The opening in the abdomen is closed.

(11) The patient is placed in the dorsal gynæcological position, the uterus drawn further down by means of forceps applied to the cervix, and the vaginal vault is circularly divided as near the vulva as is desired, taking care not to wound the rectum or bladder.

(12) The cavity left above the remaining vaginal mucous membrane is plugged with iodoform gauze.

The operation, as described by Werder, is performed as follows:—The patient having been anæsthetised, the diseased part of the cervix is removed with a sharp curette and cauterised to stop hæmorrhage, if this step has not been taken some days previously. She is then placed in Trendelenburg's position, and the abdomen is opened. The ovarian vessels are tied as close to the brim of the pelvis as possible, and the round ligament is similarly treated. The peritoneum covering the anterior face of the uterus is incised, and the bladder is pushed downwards off the uterus and also separated from the broad ligaments on either side as far as possible, in order to get the ureters out of the way. During this step the broad ligaments are opened up, and it is possible to trace the uterine arteries outwards towards the pelvic wall, where they can be tied. An assistant then passes two fingers into the vagina to act as guides, and the separation of the bladder from the anterior vaginal wall is carried downwards to within an inch or so of the vulva

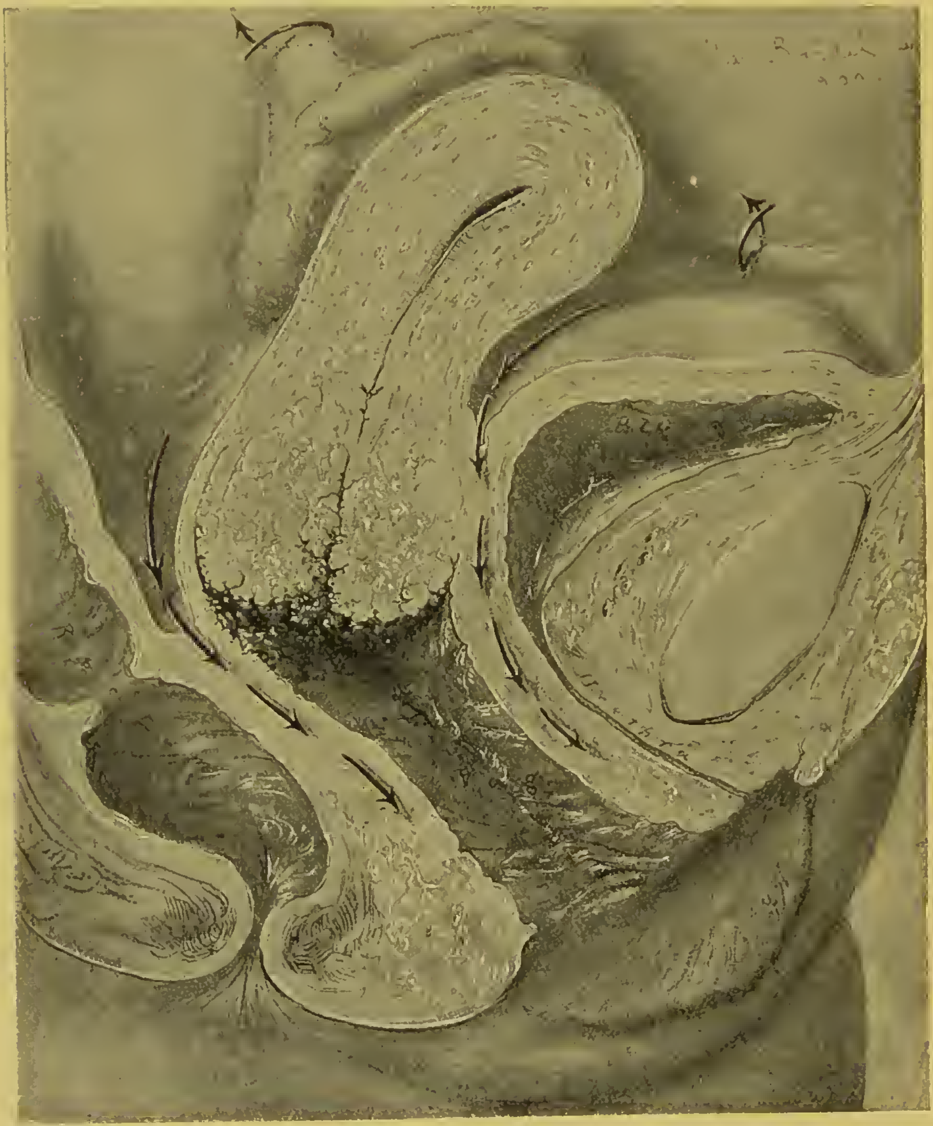


FIG. 200.—Werder's hysterectomy.—A semi-diagrammatic illustration of the first step in Werder's operation. The appendages on both sides are liberated from their attachments as near the pelvic wall as possible, and the uterus is separated from the bladder anteriorly. The dissection is then carried down into the vaginal vault to within 1 or 2 centimetres of the outlet, as indicated by the arrows. Posteriorly, the vagina is freed from the rectum to within a short distance of the outlet. Diagram showing the path followed in separating vagina from bladder and rectum. (*Cullen.*)

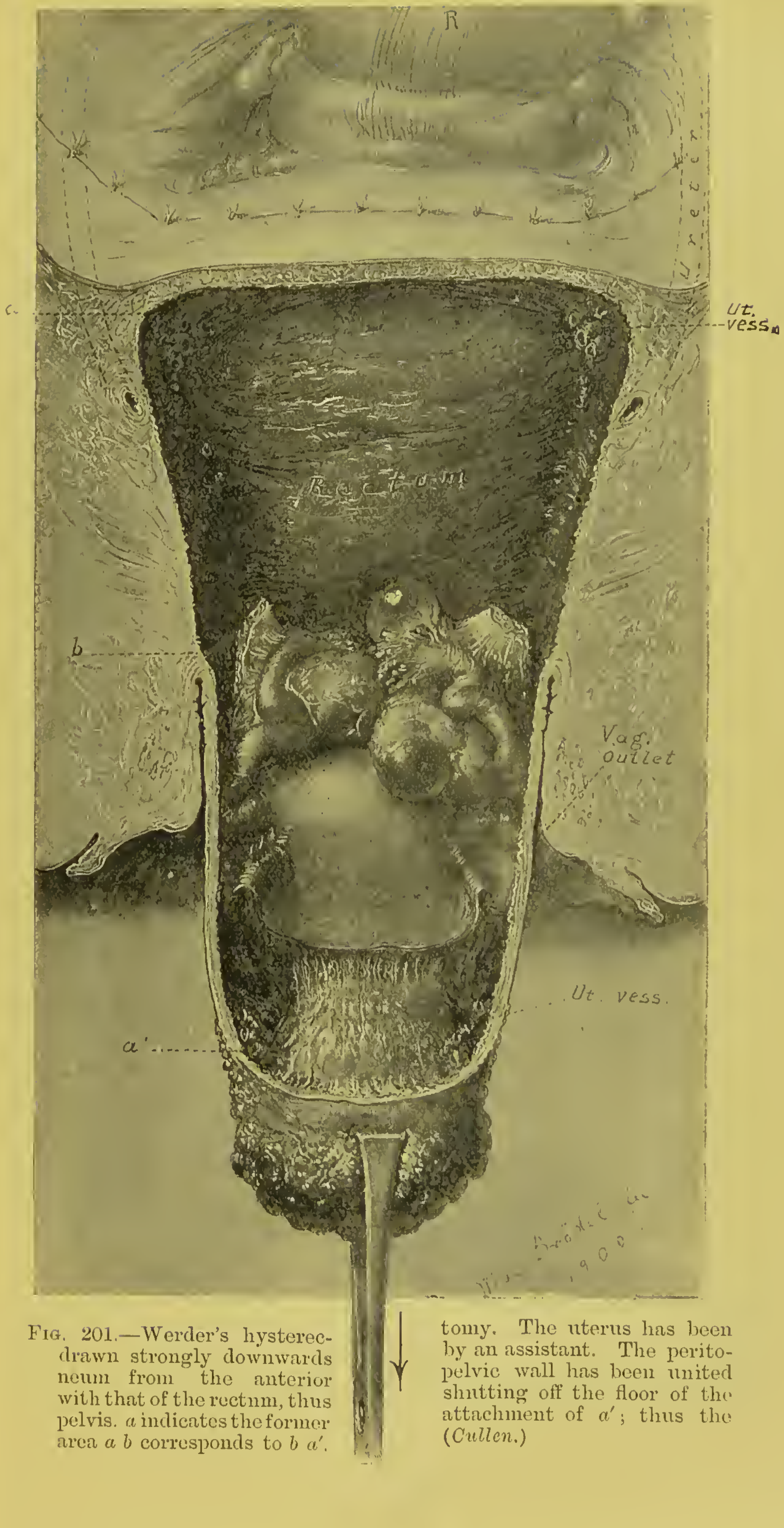


Fig. 201.—Werder's hysterectomy. The uterus has been drawn strongly downwards by an assistant. The peritoneum from the anterior pelvic wall has been united with that of the rectum, thus shutting off the floor of the pelvis. *a* indicates the former attachment of *a'*; thus the area *a b* corresponds to *b a'*. (*Cullen.*)

(*v.* Fig. 200). The sacro-uterine ligaments are next divided with scissors, the peritoneum covering the floor of Douglas' pouch is incised, and the rectum separated from the posterior vaginal wall to the same level as in the case of the bladder. This separation is carried round the vagina at each side to meet the anterior separation between the bladder and the vagina. The vagina now remains attached to the surrounding parts only by the base of the broad ligaments, which are very firmly united to the vaginal fornices. This separation is according to Werder the only really difficult part of the operation. As soon as it is accomplished, the uterus and vagina are pushed downwards through the vaginal orifice, and the anterior flap of peritoneum is sutured to the posterior flap. In this way, the peritoneal cavity is completely shut off from the retro-peritoneal cavity in which lies the displaced uterus (*v.* Fig. 201). The abdomen is then closed in the ordinary manner.

The final step of the operation consists in the removal of the uterus and a wide sleeve of vaginal mucous membrane. To do this, the patient is placed in the dorsal gynæcological position, and the uterus is seized with forceps and drawn completely outside the vagina. The positions of the bladder and rectum, relative to the inverted vagina, are then ascertained by passing a sound into the former and the finger into the latter, and the inverted vagina is amputated with the thermo-cautery or with a scalpel. A large raw cavity now exists above the remaining portion of vaginal wall, and is bounded above by the peritoneum, in front by the bladder, and behind by the rectum. This is plugged loosely with iodoform gauze. It gradually contracts, and after a fortnight is almost completely obliterated.

Complications.—The principal complications which may occur during the performance of abdominal hysterectomy, are the wounding of the bladder or ureter, or the ligation of the latter while the uterine artery is being tied. Wounds of the bladder can generally be easily closed. A ureter which has been divided must be anastomosed, implanted in the bladder, or brought out through the abdominal or vaginal wall, as is found most suitable. The rectal wall may also be damaged while opening into the vagina from the floor of Douglas' pouch, and the intestines may be injured during the separation of adhesions. In such cases, the tear must be immediately sutured.

After-treatment.—The after-treatment of ventral hysterectomy is the same as that of ventral cœliotomy (*v.* page 244).

VAGINAL HYSTERECTOMY.

Vaginal hysterectomy is the term applied to the removal of the uterus through the vaginal vault.

Indications.—Vaginal hysterectomy is indicated in the following cases :—

(1) Certain cases of myoma uteri.
(2) Malignant disease of the uterus in an early stage.
(3) Certain cases of bilateral suppuration of the uterine appendages.
(4) Certain cases of procidentia uteri.

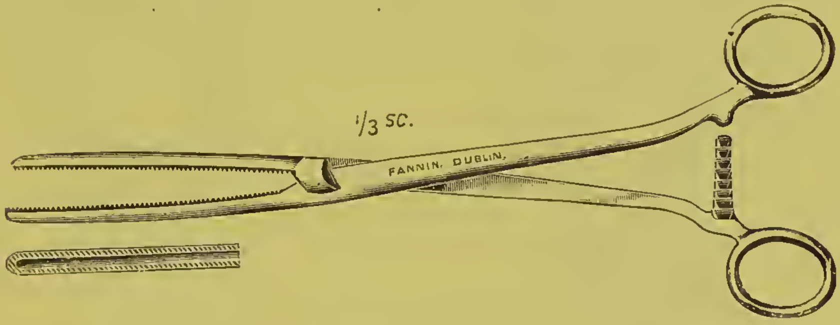


FIG. 202.—Doyen's broad ligament forceps with spring blades.

(5) Irreducible chronic inversion of the uterus.

Instruments.—The following instruments are required in addition to those given under the head of vaginal cœliotomy (*v.* page 252) :—eight small and four large volsellæ (*v.* Figs. 7 and 184); two long spring clamps (Doyen's) (*v.* Fig. 202); ten clamps of Péan's pattern with long, medium, and short serrated blades (*v.* Fig. 186).

Operations.—Vaginal hysterectomy may be performed in two chief ways :—

(I) Without mutilation of the uterus.
(II) With mutilation of the uterus.

(I) WITHOUT MUTILATION OF UTERUS.—Vaginal extirpation of the unmutilated uterus, *i. e.* without preliminary incision or removal of any part of it, is the form of vaginal hysterectomy which is indicated in all cases in which the size of the uterus, or the condition of the surrounding parts, does not prevent the uterus from being drawn down through the vagina. It can be carried out by one of two methods, according to the means taken to ensure hæmostasis :—

(A) Hæmostasis by suture,—the "suture operation" (Czerny).

(B) Hæmostasis by clamp,—the "clamp operation" (Péan).

(A) **The "Suture Operation."**—The suture operation, the introduction of which is usually attributed to Czerny, is perhaps the most commonly adopted method of carrying out vaginal hysterectomy. The various steps of the operation are as follows :—

(1) Preliminary disinfection of the field of operation, and the removal of any projecting masses of malignant disease in the case of carcinoma cervicis.

(2) The vaginal mucous membrane is incised round the cervico-vaginal junction.

(3) The bladder is pushed upwards off the uterus, and an opening is made into the peritoneal cavity through the bottom of the vesico-uterine pouch of peritoneum.

(4) An opening is similarly made into Douglas' pouch through the posterior fornix.

(5) The cervix is drawn to the left, and the base of the right broad ligament is ligated, and the portion of ligament thus controlled is divided. A second stitch is similarly passed, which includes the uterine artery.

(6) The base of the left broad ligament is similarly treated.

(7) The remaining portion of right broad ligament is then drawn down, ligated, and divided.

(8) The uterus is drawn down outside the vulva, and the remainder of the left broad ligament is ligated and divided, and the uterus is removed.

(9) The ligatures which control the ligaments are drawn downwards, and the included stumps are fixed to the divided edges of the vagina at their respective sides, by a suture which transfixes the stump and the mucous membrane.

(10) The anterior and posterior flaps of peritoneum are brought together with a catgut suture, and a gauze tampon is placed in the vagina.

The operation is performed as follows:—If the indication for the operation is malignant disease of the vaginal portion, all malignant masses must first be curetted away and the cavity thus formed well cauterised with the thermo-cautery. Three stout silk ligatures are then passed through the anterior and posterior lips so as to close the cervical canal, and at the same time afford a means of applying traction on the uterus. The operator, holding these sutures in one hand, incises the vaginal mucous membrane round the cervix at the level of the cervico-vaginal junction (*v.* Fig. 203). Then, as in a vaginal cœliotomy, the bladder is pushed up in front and the anterior pouch of peritoneum exposed and opened, and similarly posteriorly an opening is made into Douglas' pouch (*v.* Figs. 204, 205). It is most important that the bladder should be pushed up not only

Fig. 203.

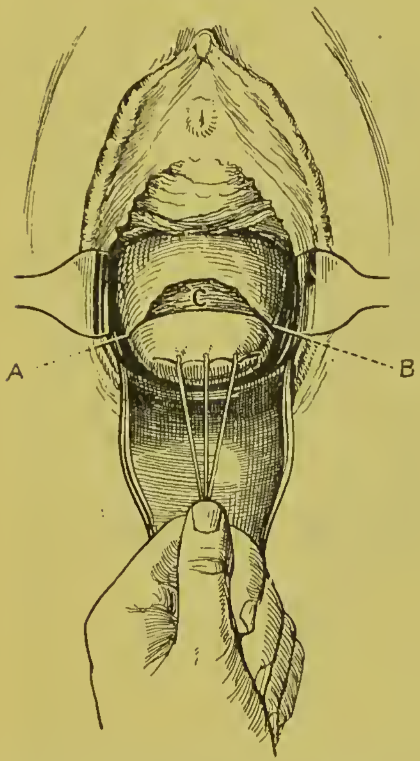


Fig. 204.

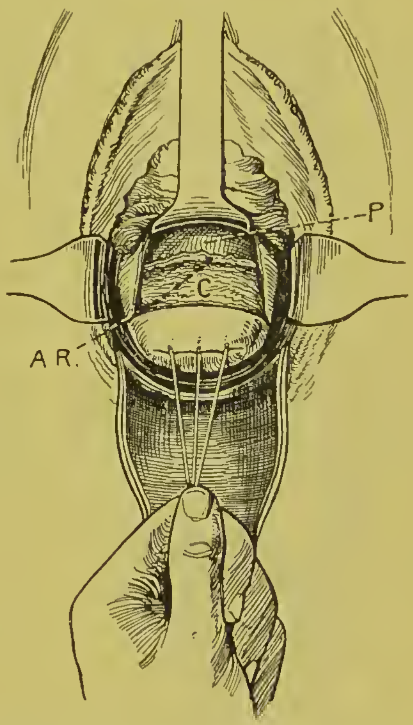


Fig. 203.—Vaginal hysterectomy. An incision A, B, has been made round the anterior aspect of the cervix. C. Exposed cervical tissue.

Fig. 204.—Vaginal hysterectomy. The bladder has been pushed up, and the peritoneal reflexion exposed and opened. C. Exposed cervical tissue. A.R. Cut edge of peritoneum. P. Peritoneum covering anterior wall of uterus.

in front but at the sides, as in doing the latter the ureters are also pushed upwards and so carried away from the para-cervical region. In this way, subseqnent injury to them is avoided

The cervical sutures are then given to an assistant who draws them towards the patient's left side, in such a manner as to expose the base of the right broad ligament. A stout silk ligature is passed with an ordinary right-angled pedicle needle, through the base of the ligament at the distance of a centimetre from the uterus, and in such a manner as to include a portion of ligament a centimetre in diameter. This is tied tightly, and the portion of ligament controlled by it divided as close to the uterus as possible. A second suture is then passed in the same manner through the base of the undivided portion of the

Fig. 205.

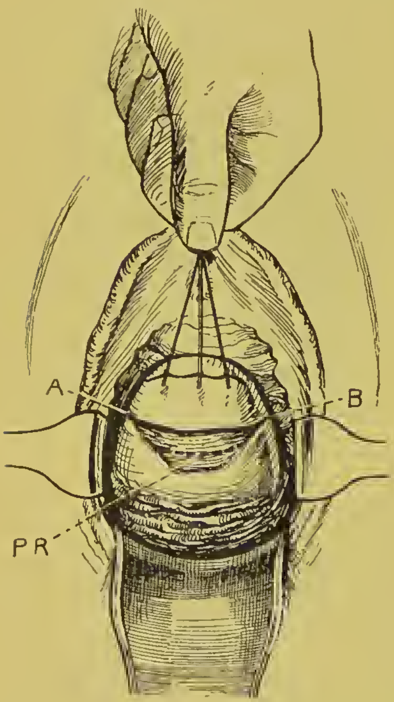


Fig. 206.

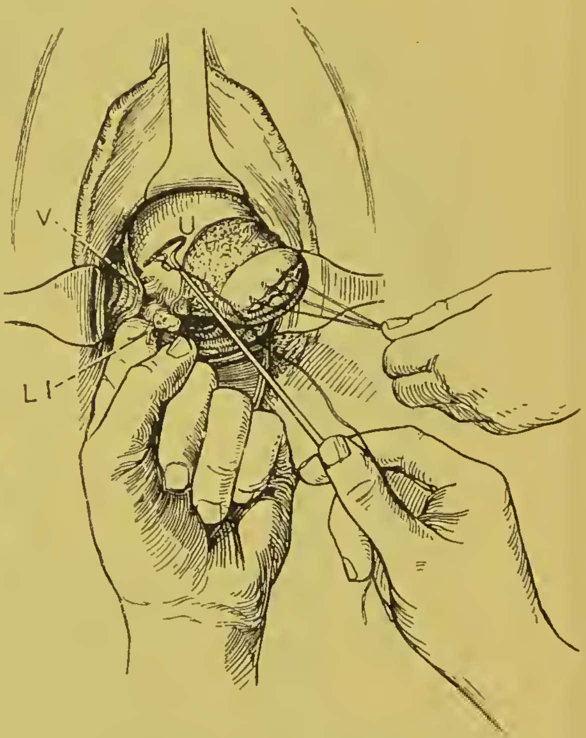


Fig. 205.—Vaginal hysterectomy. An incision A, B, has been made round the posterior aspect of the cervix, and the posterior reflexion P.R. exposed.

Fig. 206.—The uterus is drawn over towards the operator's right, and one suture, L. 1, has been placed in the base of the right broad ligament. A second suture is in process of being applied. V. Vaginal mucous membrane. U. Uterus.

ligament, tied, and the controlled portion cut (*v.* Fig. 206). If this ligature includes the uterine artery we turn our attention to the opposite side; if it does not, another is passed which will do so. The base of the left broad ligament is next ligated in a similar manner, and divided.

The uterus can now be drawn further downwards, and, if the finger is passed through the anterior opening in the peritoneum, the top of the broad ligament on the right side can be pulled down by hooking the finger behind it (*v.* Fig. 207). If it is desired to remove the ovary and the tube as well, the latter can be drawn down in a similar manner after first separating any adhesions which may hold it. The remaining portion of broad ligament on the right side is then tied off, with one or two sutures as necessary, and divided, the ligatures being

Fig. 207.

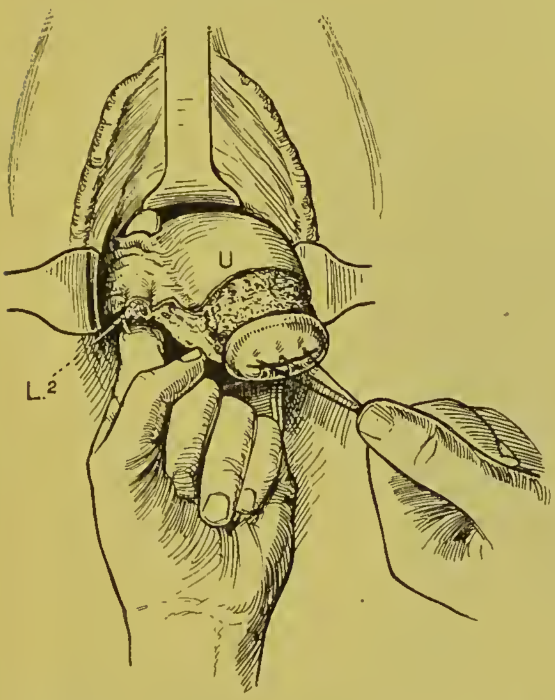


Fig. 207.—Vaginal hysterectomy. The second ligature, L. 2, on the broad ligament has been tied, and the finger passed above the free edge of the ligament in order to hook it down for the insertion of the last ligature.

Fig. 208.

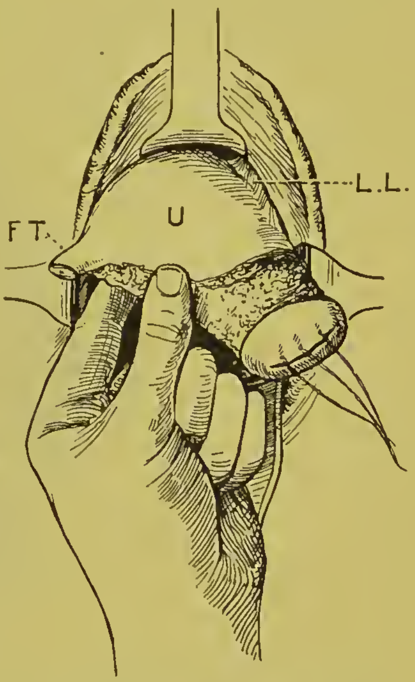


Fig. 208.—Vaginal hysterectomy. The right broad ligament has been tied and divided, and the uterus is being drawn over to the operator's left to expose the left broad ligament. F. T. Uterine end of Fallopian tube. U. Uterus.

passed inside or outside the ovary as is required. As soon as this is done, the uterus can be drawn down outside the vulva, and its remaining attachment, *i. e.* the upper half of the left broad ligament, ligated and divided (*v.* Fig. 208). If there is still any hæmorrhage, it is probably due to small vessels in the vaginal walls, or to the slipping of a ligature. As soon as it has been checked, the ligatures attached to the cut ends of the ligaments are separated, to correspond with their proper sides, and the cut end of each broad ligament is in turn drawn down and fixed, by a suture passed with a medium-sized sharp needle, to the corresponding side of the vaginal opening. If the ovaries have been removed, the ligatures on the ovarian vessels should be cut off short and not drawn down, as such traction might cause them to slip. Finally, the anterior and posterior flaps of peritoneum are brought together by means of a few catgut sutures (*v.* Fig. 209). If any suppurative processes in the pelvic cavity are opened in the course of the operation, it is better not to close the peritoneum, but rather to plug the pelvic cavity with iodoform gauze, the ends of which are brought down into the vagina (*v.* page 395).

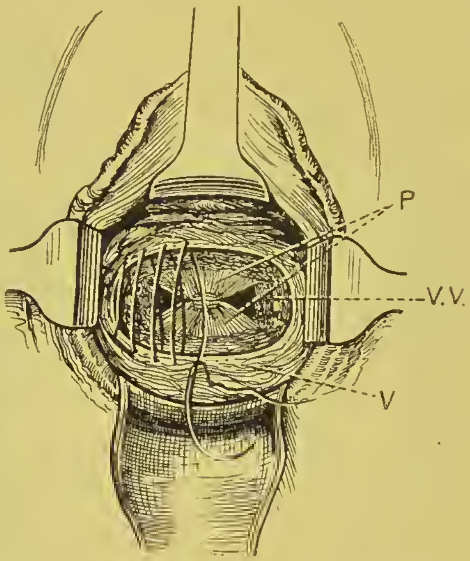


FIG. 209.—Vaginal hysterectomy. The uterus has been removed, and the anterior and posterior flaps of peritoneum (P) brought together by a catgut suture. The vaginal edges are in process of being similarly brought together. V. V. Uterine vessels. V. Vaginal mucous membrane.

(B) **The "Clamp Operation."**—The use of clamps instead of suture to ensure hæmostasis was introduced by Péan and Richelot. The following advantages are claimed for this method of controlling the vessels (Landau) :—

(1) It shortens the operation.

(2) The clamps afford a handle by which the pedicles can be drawn down for inspection, and they subsequently keep such pedicles in an extra-peritoneal position.

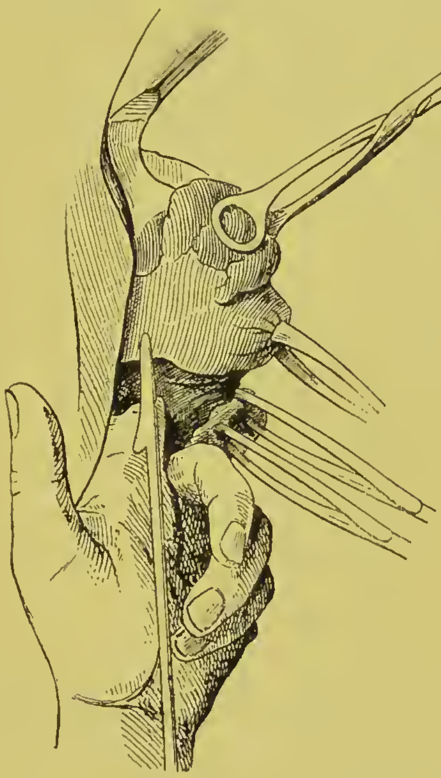


FIG. 210.—The application of the first clamp in vaginal hysterectomy—clamp operation (Landau).

(3) The clamps act as a drain by keeping the vaginal walls apart.

(4) By the crushing and necrotising effect of the clamps upon the tissues they grasp, germs lying in these tissues are destroyed, and the lymphatics are closed against the entrance of additional bacteria from without.

The main points in which the operation differs from the "suture operation" are as follows:—If the uterus is free from adhesions, the fundus, and the ovaries and tubes if necessary, are brought out anteriorly before any clamps are applied. The clamps are then applied, starting either below or above as may be preferred. If their application is commenced below, the cervix is drawn well over to the left, and a clamp with short or medium jaws applied so as to include the base of the broad ligament and the uterine artery (*v.* Fig. 210). This portion is then divided at the uterine side of the clamp, and another clamp is placed at a higher level as in the case of the sutures. The controlled piece is in turn divided, and another clamp applied still higher. In this way the whole of one side is clamped and divided (*v.* Fig. 211). In some cases, it may be found sufficient to use one long clamp applied over the entire height of the ligament. If this is done, another lighter clamp must be placed outside it as an additional protection. The objection to a single clamp is that it is difficult to get uniform pressure on the entire ligament in this way, and that, consequently, a portion of the latter may subsequently retract from the grip of the clamp and bleed. When the ligament is being divided, the incision should be kept as close to the uterus as possible so as to leave some tissue beyond the clamp. The opposite ligament is next clamped and divided, in a similar manner.

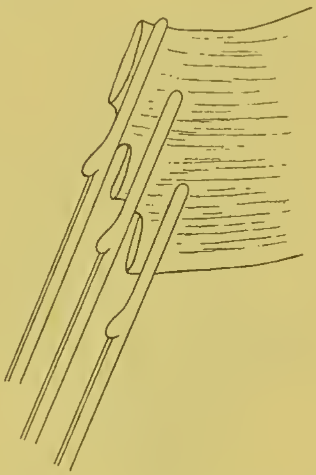


FIG. 211.—Diagram of the manner in which the broad ligament is controlled by clamps in vaginal hysterectomy (Landau).

If the uterus is fixed owing to the existence of malignant or inflammatory disease, so that it cannot be pulled down and everted through the anterior incision, the application of the clamps must be primary, *i. e.* they must be applied before the uterus is brought down externally, in the same manner as the ligatures are applied in the suture operation. Finally, a light tampon of iodoform gauze is passed into the vagina, and a part of it introduced into the pelvic cavity if there has been any escape of septic matter.

(II) With Mutilation of the Uterus.—Vaginal extirpation of the uterus in a mutilated condition is indicated when the size of the organ, or the condition of the appendages, prevents its delivery through the vagina in one piece. It is usually necessary in the case of myomata, or suppurative conditions of the adnexæ. Uterine enlargement due to malignant disease is a contra-indication to this course, as the opening of the uterine cavity would probably tend to assist the dissemination of such a condition. There are so many different operations for the vaginal removal of an enlarged uterus that it would be impossible to go into all of them in detail. A very concise description of them will be found in Landau's 'Radical Vaginal Operation.' Here, it is only possible to give a short note on the most important.

The operation can be carried out by the following methods :—

(1) By median incision of the anterior (Doyen) or both (Quénu, Müller) uterine walls.

(2) By morcellation with V-, Y-, or disc-shaped incisions of the anterior wall (Doyen), or with bilateral incision of the entire uterus (Péan, Segond).

The object of all these operations, and of others of the same kind, is to make it possible to bring down through the vagina an uterus which otherwise would be too large or too fixed in its position to allow such a course. In Doyen's operation of sagittal median incision of the anterior wall, the object is to enable the uterus to open out—so to speak, and so by diminishing its antero-posterior diameter to allow the fundus to be brought out through the opening in the anterior cul-de-sac (*v.* Fig. 212). In Quénu and Müller's operation, the uterus is divided sagittally in the mesial line into halves, each of which is brought down separately (*v.* Fig. 213). In both these operations, hæmostasis, either by clamp or by ligature, is secondary or consecutive; that is to say, it is not performed until the uterus and appendages have been brought down outside the vagina. Both Doyen's and the Quénu-Müller operation are most suited to cases in which there is suppurative disease of the adnexæ; the latter being the more suited to those cases in which the appendages are of large size.

Doyen's operation of morcellation consists in removing the anterior wall of the uterus piecemeal. Hæmostasis is secondary.

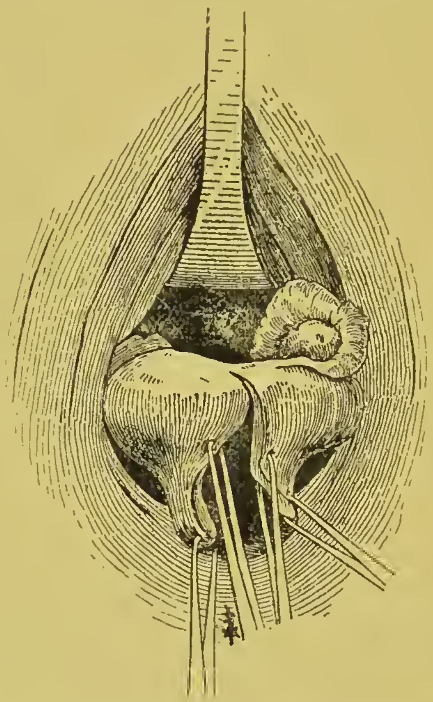


FIG. 212.—Doyen's vaginal hysterectomy, by median incision of the anterior uterine wall (Labadie-Lagrave).

The operation is intended for myomata which cannot be enucleated in such a manner as to leave the uterus functionally perfect, and which do not reach above the umbilicus. It is a tedious operation, and one which is now seldom performed on account of the improvements in, and consequent better results of, ventral hysterectomy. The accompanying diagram will give a general idea of the manner in which the uterine wall is incised and removed (*v.* Fig. 214).

Péan's operation, which is also intended for myomata, differs from the foregoing in that hæmostasis is primary; that is, the broad ligament is clamped in segments, from below upwards, before the corresponding level of the uterus is split and removed; and that, instead of making a **V**-shaped incision in the anterior wall and removing the portion between the arms of the **V**, the uterus is split bilaterally into an anterior and a posterior segment, and from each of these successive horizontal pieces are removed. Accordingly the operation may be divided into successive stages, each of which in turn consists of four steps :—

(1) The freeing of the lowest portion of the anterior and posterior face of the uterus.

(2) The clamping and division of the lowest portion of the broad ligaments.

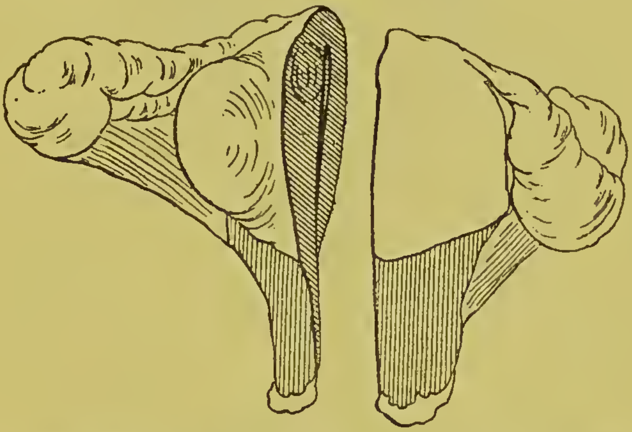


Fig. 213.—Quénu-Müller's vaginal hysterectomy, by complete median incision of the uterus (Labadie-Lagrave).

(3) The division into two segments of the piece of the uterus thus cleared and controlled.

(4) The removal in horizontal pieces of the two segments.

Then another portion of uterus is cleared, clamped, split, and removed, as before, and so on until the fundus is reached.

Segond's operation resembles the foregoing in the primary clamping of the uterine vessels, and in the removal of the cervix in horizontal pieces after bilateral division. It differs in that he does not complete hæmostasis until the uterus has been delivered, and that the removal of the body is accomplished by the excision of wedge-shaped pieces from the anterior wall somewhat in the manner of Doyen. It is intended for myomata, and, in common with Doyen's and Péan's operation, has been almost completely superseded by ventral hysterectomy.

Complications.—The complication which is most likely to occur in vaginal, as in ventral hysterectomy, is wounding of the ureters, bladder, or rectum. The thorough dislocation of the bladder upwards, as a preliminary to the ligation and division of the base of the broad ligaments, is the best mode of preventing the occurrence of the first two of these. The rectum is most likely to be injured while Douglas' pouch is being opened, or while firmly adherent appendages are being enucleated.

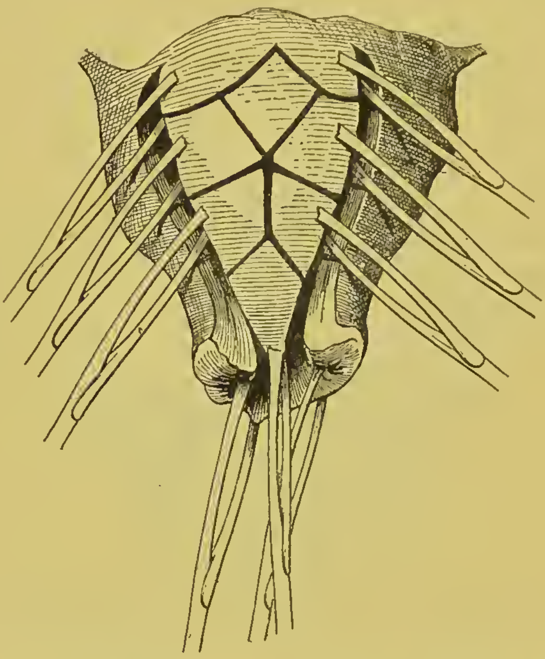


FIG. 214.—Doyen's vaginal hysterectomy, by morcellation. Scheme of the manner in which the fragments are removed (Landau).

After-treatment.—The after-treatment is the same as in the case of vaginal cœliotomy (*v.* page 252).

MYOMECTOMY AND ENUCLEATION.

By the term myomectomy (μῦς, muscle; ἐκτομή, a cutting out) is meant the removal of a pedunculated myoma; and by enucleation, the shelling out of a sessile or interstitial myoma.

Here, we are only concerned with these operations when they are adopted with the object of removing interstitial or subserous myomata. The removal of submucous myomata has been already discussed (*v.* page 333).

Indications.—One or other of these operations is indicated, according to the nature of the tumour, in all cases in which a myoma is causing so marked symptoms as to require its removal, or in which it is obviously increasing rapidly in size, and in which its removal is possible without the performance of hysterectomy.

Instruments.—The instruments given under the head of ventral or vaginal cœliotomy are all that are required (*v.* pages 236, 252).

Operations.—The two operations must be discussed separately.

Myomectomy.—The operation of myomectomy is usually quite simple. It can be performed by the vaginal route if the tumour is of sufficiently small size to be brought through an opening in one or other of the vaginal fornices, either entire or in fragments. If the myoma is too large for this, the abdominal route is chosen. Whatever route is selected the peritoneal cavity is opened, and the tumour drawn out through the wound. If the pedicle is thin, it is tied by means of two interlocking silk sutures and then divided. If the tumour is attached by a broad base, temporary hæmostasis must be first obtained, when operating by the abdominal route, by passing an elastic ligature round the lower uterine segment, or by an assistant grasping the lower segment firmly in his hands. The tumour is then cut away by means of a wedge-shaped incision, and the edges of the latter are brought together by means of deep interrupted silk sutures, with intermediate sutures of catgut if required. The temporary ligature is next removed, and any bleeding stopped by further sutures. Finally, the uterus is returned to the abdomen, and the wound closed.

Enucleation.—Enucleation is a more troublesome operation, as far as hæmostasis is concerned. It, like myomectomy, can be performed by the vagina, in the case of small tumours, or by the abdominal route in the case of large. In the case of a small tumour, an incision is made through its capsule, the growth shelled out with the handle of the scalpel, and the cavity closed by interrupted silk or catgut sutures. In the case of larger tumours, temporary hæmostasis must be first obtained as described above. An incision is then made over the most prominent part of the tumour, the mass shelled out, and the cavity sutured in superimposed layers with a continuous catgut suture. If the uterine cavity is opened, it may be advisable to pass a drain from the bed of the myoma into it before closing the uterine wall and peritoneum. The objection to enucleation is the difficulty of checking hæmorrhage. Bleeding vessels may be picked up and tied, but general oozing from the walls of the cavity left by the removed myoma is very difficult to control. Alexander proposes to plug this cavity with iodoform gauze, over which the wall of the uterus is brought together by catgut sutures, except at one spot where the end of gauze emerges. He then passes a single silkworm-gut suture through the upper angle of the uterine incision and the abdominal wall, so fixing the uterus in apposition with the latter. The abdominal wall is next sutured, with the exception of an opening at the lower angle of the wound through which the gauze passes (*v.* Fig. 215). The gauze is removed gradually as the cavity diminishes in size. He does not confine himself to the removal of single myomata,

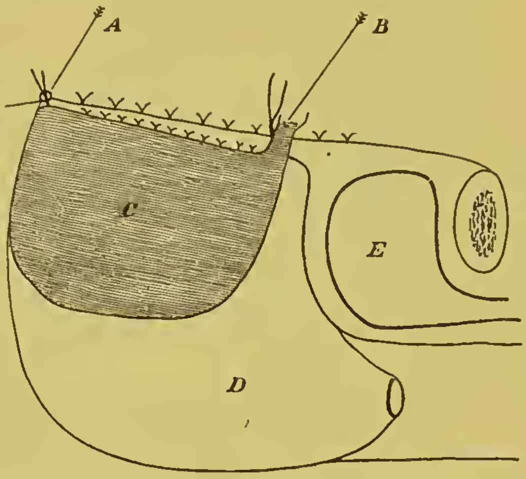


FIG. 215.—Alexander's operation for the enucleation of subserous and interstitial myomata. D. Uterus. E. Bladder. C. Cavity from which the myoma has been removed, plugged with iodoform gauze. B. End of gauze protruding through opening at the bottom of abdominal wound. A. Suture at upper end of opening in uterus fixing the latter to the abdominal wall (Alexander).

but has removed as many as twenty-five through a single opening in the anterior uterine wall.

Enucleation is an ideal proceeding for the removal of interstitial myomata, as it usually leaves the uterus functionally perfect. Unfortunately, the number of cases in which it can be carried out is not very great.

After-treatment.—The after-treatment is the same as that of ventral or vaginal cœliotomy, as the case may be (*v.* pages 244, 261).

HYSTEROPEXY.

Hysteropexy (*ὑστέρα*, the womb; *πῆξις*, a fastening) is the term applied to the fixation of the uterus to the abdominal or vaginal wall with the object of correcting a malposition.

Indications.—Hysteropexy is indicated under the following conditions :—

(1) In backward displacements of the uterus which give rise to symptoms, and in which—(*a*) no pessary can be found which will keep the uterus in place; (*b*) the wearing of a pessary is associated with continual discomfort, or with the occurrence of vaginitis; (*c*) the patient lives under circumstances which preclude her from obtaining the necessary periodical medical advice (*v.* page 88).

(2) In descent of the uterus due to laxity of its ligaments, rather than to lesions of the pelvic floor, and in which a pessary is unsuitable for the reasons given above.

Instruments.—The instruments required are the same as for ventral or vaginal cœliotomy, as the case may be (*v.* pages 236, 252).

Operations.—The uterus may be sutured to the abdominal or vaginal walls, and accordingly there are two classes of operation :—

(A) Ventral hysteropexy.
(B) Vaginal hysteropexy.

(A) **Ventral Hysteropexy.**—Ventral hysteropexy consists in suturing the fundus of the uterus to the abdominal wall in the median line. Some authorities consider it to be superior to vaginal hysteropexy in all cases. It is at all events the form of operation indicated when hysteropexy is required in the course of a ventral cœliotomy. Several modifications of this operation have been introduced from time to time. In all cases, the first step consists in the opening of the abdomen in the middle line, immediately above the symphysis, and the freeing of the uterus—if held by adhesions. The next step consists in the fixation of the uterus. The original method of fixation consisted in passing two or three silk or silkworm-gut sutures through the entire thickness of the abdominal wall at the lower end of the initial incision, then fairly deeply, transversely, through the fundus of the uterus, and out through the opposite abdominal wall. The sutures should be about a centimetre apart, and the lowest is passed first and tied before the others are inserted. This operation has been improved upon by various operators and modified in several ways.

Pozzi fixes the anterior wall of the uterus by means of a continuous suture of fine silk, which traverses the peritoneum, muscle, and aponeurosis of the abdominal wall. Olshausen and Sänger fix the uterine cornu to the abdominal wall at each side of the incision, and leave the anterior face of the uterus free, whilst others pass the fixation sutures through the round ligaments.

Kelly recommends passing the sutures through the peritoneum of the abdominal wall only, and through the posterior wall of the uterus just below the fundus. The steps of this operation are as follows :—

(1) The bladder is emptied with a catheter and the abdomen is opened in the middle line by an incision of one and a half to two inches in length, and ending three-quarters of an inch above the symphysis.

(2) The index and middle finger are passed into the peritoneal cavity and down to the fundus, and any adhesions affecting the latter or the appendages are separated. Two fingers are then passed behind the uterus, and the latter is drawn upwards until the fundus lies behind the symphysis. If desired, the special elevators designed for this purpose by Kelly may be used.

(3) The edges of peritoneum are caught in a clip forceps at both sides of the wound, and are drawn outwards. A silk

suture threaded on a small curved needle is then passed through the peritoneum and subperitoneal structures, in such a manner that it is entered on the inner surface of the peritoneum about a centimetre from the edge, traverses the latter and the subperitoneal structures, and again emerges on the inner surface, including about a centimetre of peritoneum. It is then passed through the posterior surface of the uterus in the middle line, one or two centimetres below an imaginary line drawn between the uterine insertion of the tubes. It includes a piece of uterine tissue about a centimetre in width and a quarter to half a centimetre in depth. It then traverses the peritoneum of the opposite side in the reverse manner to that in which it was entered (*v.* Fig. 216). This suture is drawn tight, taking care that a piece of intestine is not included between it and the uterus, and is tied. A second suture is then introduced. It passes through the peritoneum in a similar manner to and about a centimetre above the first, and through the posterior uterine wall a centimetre below it (*v.* Fig. 217).

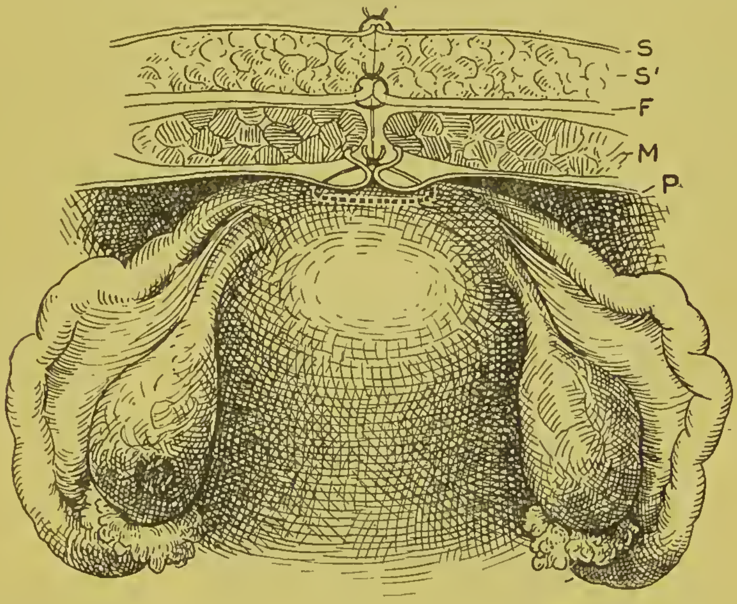


FIG. 216.—Abdominal hysteropexy. Kelly's method. Showing the first fixation suture in position, and the sutures in the abdominal wall. S. Skin. S'. Subcutaneous fat. F. Fascia. M. Muscle. P. Peritoneum. (*Kelly.*)

(4) The omentum is drawn down, a careful examination is made to see that a loop of intestine has not been caught in

any way, and the abdominal wound is closed in the usual manner.

Kelly considers that as the adhesions which are thus formed between the uterus and the peritoneum stretch, a more normal position of the uterus results than is the case when the fundus or the anterior face of the uterus is sutured to the abdominal wall.

(B) **Vaginal Hysteropexy.**—Vaginal hysteropexy consists in suturing the uterus to the anterior vaginal wall, or in some cases to the bladder. The initial steps of the operation are those described under the head of vaginal cœliotomy (*v.* page 253). The uterus is then freed from adhesions, and brought forward into the opening in the vaginal vault. Three silkworm-gut sutures are used to fasten it in this position. They are entered through the vaginal flap at one side, then passed through the peritoneum at the same side, then through the middle of the anterior face of the uterus, and then through the peritoneum and vaginal flap of the opposite side. The sutures should traverse the uterus just sufficiently above the level of the uterine isthmus to keep the fundus forwards (*v.* Fig. 218),

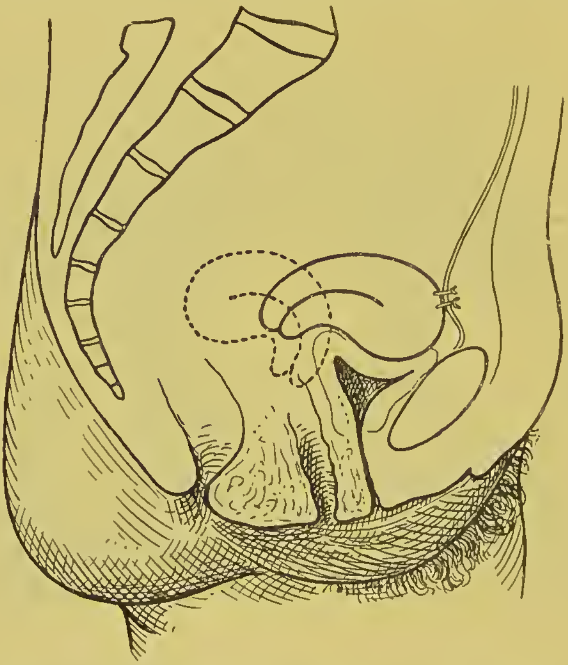


FIG. 217.—Abdominal hysteropexy. Kelly's method. The position of the uterus after fixation has been performed. (*Kelly.*)

and their exact position depends upon the size and length of the uterus. The heavier and the longer the uterus, the higher the sutures must be passed through the anterior uterine wall. It is a mistake to pass them higher in the body than is necessary, as the higher they are situated the more the normal degree of mobility of the uterus is interfered with. The main objection to all forms of vaginal hysteropexy is the resultant interference with this mobility, and, by passing the sutures in the manner indicated, this objection loses its force. The sutures are passed about a centimetre apart, and should not be tied until the vaginal wound has been united by a continuous catgut suture.

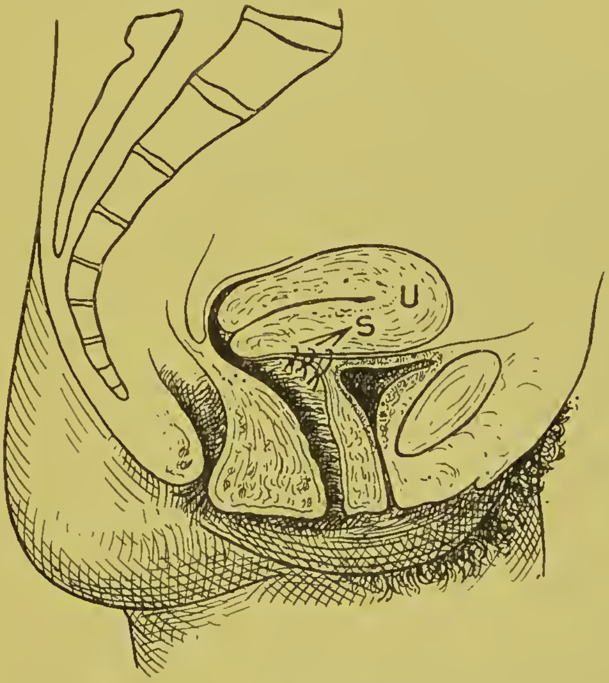


Fig. 218.—Vaginal hysteropexy. The fixation sutures in position. U. Uterus. S. Sutures.

This operation, which was originated by Mackenrodt, has been lately given up by him for an operation which he terms vesico-fixation. It consists of the following steps:—

(1) Longitudinal incision of the vagina, and dissection of the vaginal walls laterally off the bladder.

(2) Stripping of the bladder from the uterus, and opening of the anterior cul-de-sac.

(3) Suture of the peritoneum, which covers the bladder, to the fundus of the uterus.

(4) Fixation, layer by layer, of the bladder wall, which has been stripped from the cervix, to the body of the uterus down to the level of the os internum.

(5) Suture of the vaginal incision, as in colporrhaphy.

Mackenrodt claims that this operation brings the uterus into a normal position, while at the same time it permits all necessary freedom of movement. Vaginal fixation is, however, a simpler operation to perform, and, if the sutures are passed in the manner indicated above, it allows the uterus all necessary mobility.

Dührssen formerly operated through a transverse incision at the junction of the anterior vaginal wall and the cervix, and fixed the uterus by two silkworm-gut sutures passed sagittally through the vaginal walls and the fundus. This proceeding tended to bring the uterus into a position of too great anteflexion, and consequently gave rise to very serious trouble during pregnancy and labour.

To avoid these troubles he modified his technique. He now opens the vaginal fornix by a ⊥-shaped incision, very similar to Mackenrodt's incision, and thus opens the peritoneum sagittally. "One fixation suture is then passed through the vagina and the peritoneum, near the upper end of the peritoneal opening, and then through the uterus. Before it is tied, the cut edges of peritoneum are closed by a continuous catgut suture, then the fixation stitch is tied, and the vaginal wound is closed in the ordinary manner. In this way, the peritoneum covering the fundus forms a purely sero-serous cohesion with the peritoneum which has been stripped off the bladder, and this stretches during pregnancy.

We consider, however, that fundal fixation, no matter of what kind, is a mistake, and should be avoided. The operation which will give the best after-results is that which brings about as far as possible a normal position of the uterus, and at the same time preserves its normal mobility. Fundal fixation does not bring about a normal position, even if it permits normal mobility, and, consequently, we prefer the method which we have already described of passing the sutures.

After-treatment.—The after-treatment of these cases is the same as that of ventral or vaginal cœliotomy as the case may be (*v.* pages 244, 261). During the first four or five days the catheter should be passed every four hours, if the patient cannot empty the bladder of her own accord, to prevent any undue pressure on the uterus by a distended bladder. Abdominal fixation sutures may be left *in situ* for ten days, while vaginal sutures are not taken out, as a rule, for three weeks. The patient should not be allowed out of bed after vaginal fixation for at least fourteen days, and a longer time is advisable if the uterus is of large size.

RADICAL CURE OF INVERSIO UTERI.

The only operation, which it is necessary to describe under this heading, is that originated by Küstner. It consists in performing a posterior colpotomy, and then dividing the constricting isthmus of the uterus, with the object of permitting the pushing up of the body.

Indications.—Küstner's operation is indicated in the case of inversion of the uterus occurring in women who have not reached the menopause, when less radical measures have failed (*v.* page 101).

Instruments.—The instruments required are the same as those given under the head of vaginal cœliotomy (*v.* page 252).

Operation.—The various steps of the operation are as follows :—

(1) Douglas' pouch is opened by means of a wide transverse incision through the posterior fornix.

(2) The index finger is introduced through the opening into the funnel of the inverted uterus, and any adhesions present are detached.

(3) A longitudinal incision is made through the posterior uterine wall, in the middle line, starting two centimetres above the *inverted* fundus, and finishing two centimetres from the os externum. This incision extends completely through the uterine wall, with the exception of the peritoneum.

(4) The constricting funnel is fixed by the index finger in Douglas' pouch, and the uterus is replaced by pushing up the fundus with the thumb of the same hand.

(5) The uterine incision is closed by deep and superficial

sutures passed from the peritoneal surface, and the opening in Douglas' pouch and the vaginal wall are brought together with a continuous catgut suture.

(6) The uterine cavity is firmly plugged with iodoform gauze, and a light tampon of the same material is placed in the vagina.

After-treatment.—The gauze must be removed on the next day, or the day following that. If there is any tendency to the recurrence of the inversion, the uterine cavity should be plugged again. The administration of ergot is probably advisable, to bring about involution of the uterus.

CHAPTER XXII.

OPERATIONS ON THE TUBES AND OVARIES.

Salpingectomy—Indications—Instruments—Operation—After-treatment. Salpingostomy—Indications—Instruments—Operation. Ovariotomy—Indications—Instruments—Operation—Complications—After-treatment Oöphorectomy, Salpingo-oöphorectomy—Indications—Instruments—Operation. Resection of the Ovary and Ignipuncture—Indications—Instruments—Operation.

SALPINGECTOMY.

Salpingectomy (σάλπιγξ, a tube; ἐκτομή, a cutting out) is the term applied to the removal of the tubes. Salpingotomy (σάλπιγξ; τομή, a cutting) has also been applied to the same operation, but it is a term which should be only used to denote cutting operations on the tubes, and not their removal. Salpingectomy is an operation which is not very frequently performed alone, inasmuch as any condition of the tube which calls for its removal is almost always accompanied by a condition of the ovary which calls for the removal of the latter also. In such a case, the operation falls under the head of ovariotomy or salpingo-oöphorectomy.

Indications.—The following conditions of the Fallopian tubes are indications for salpingectomy alone.

(1) Cystic conditions, pyo-, hydro-, and hæmato-salpinx.
(2) Inflammatory non-cystic changes, which are too extensive to be cured by means of palliative treatment or plastic operations.
(3) New growths, which are non-malignant.
(4) Tubal pregnancy.

Instruments.—The instruments required are the same as those mentioned under the head of ventral or vaginal cœliotomy, according to the route determined on (*v.* pages 236, 252).

Operation.—The first point to determine is the route by which the diseased tube is to be removed. As a general rule operations on the adnexa should, so far as possible, be performed by the vaginal route, unless there is a distinct reason to the contrary, in which case the abdominal route must be chosen (*v.* page 247).

As soon as the tube has been exposed, by whatever route is thought best, the first step consists in drawing it out into the wound. This is easily performed if there are no adhesions, but if there are adhesions these must first be broken down. This can be accomplished by wiping them off by means of a gauze sponge, by breaking them down with the fingers, or, if they are very firm, by dividing them with a scalpel or scissors. The next step consists in the ligation of the broad ligament and of the uterine end of the tube. This is most generally done by passing a double ligature through the broad ligament beneath the middle of the tube, and then dividing the loop (*v.* Fig. 219). The two ligatures thus obtained are interlocked by crossing their ends, and one ligature is tied as close to the uterus as possible, so as to include the uterine end of the tube, while the other is tied over the end of the broad ligament between the ampulla of the tube and the ovary, and as close to the latter as possible. The broad ligament and the uterine end of the tube are then

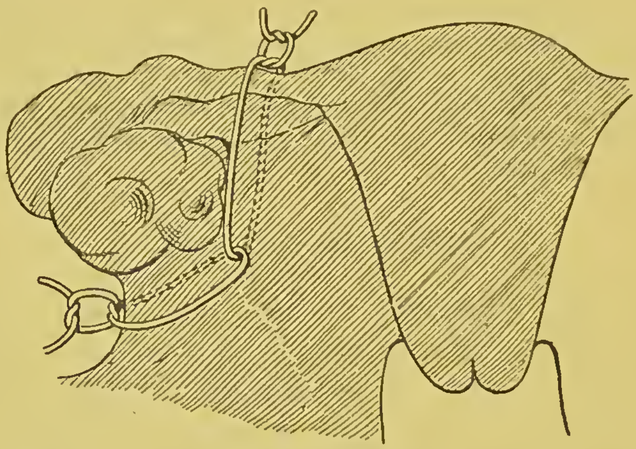


FIG. 219.—Salpingo-oöphorectomy. The usual mode of inserting and tying the sutures.

divided, taking care to leave sufficient tissue beyond the ligature to prevent the latter from slipping.

There are certain objections to this course of procedure. First, there is a slight risk of the ligature slipping, and, secondly, the ligature which is over the uterine end of the tube is in contact with a possibly septic surface from which it may afterwards become infected (Labadie-Lagrave). A preferable method is as follows:—Place a compression forceps upon the infundibulo-pelvic ligament, another upon the uterine end of the tube, and cut off the tube. The divided vessels will be seen, and are caught in forceps and tied separately (*v.* Fig. 220, A, B). Then remove the forceps, and tie any further vessels which may bleed. Next, cauterise the uterine end of the tube with a thermo-cautery, and finally bring together the peritoneum over the top of the broad ligament with a continuous catgut suture.

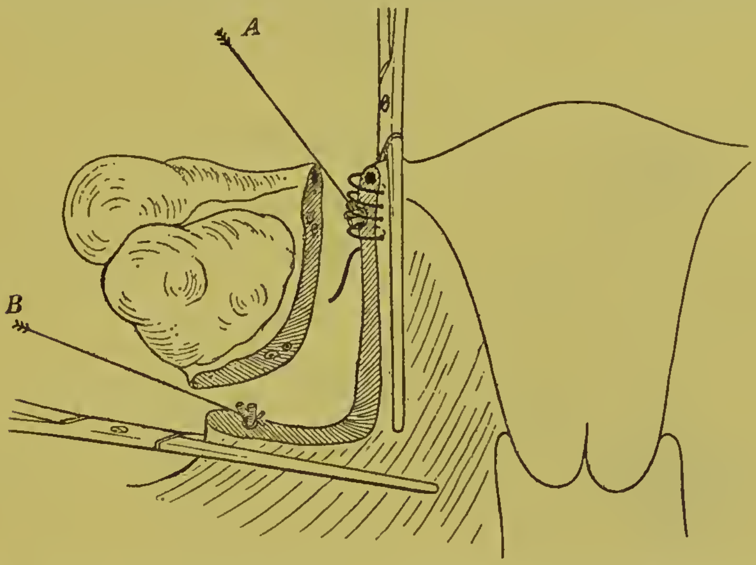


FIG. 220.—Salpingo-oöphorectomy. Another method of securing the cut surface of the broad ligament. A. Ligature on vessels at top of broad ligament. B. Ligature on ovarian vessels. Continuous catgut suture bringing the peritoneum together.

After-treatment.—The after-treatment is the same as that of vaginal or ventral cœliotomy, as the case may be (*v.* pages 244, 261).

SALPINGOSTOMY.

Salpingostomy (σάλπιγξ, a tube ; στόμα, a mouth) is the term applied to the operation for making a new abdominal ostium to the tube, or to the dilatation of the natural opening which has become contracted or obliterated. Pozzi applies the term to the former operation alone, that is to those cases in which an entirely new opening is made ; while to the latter and more common operation, he applies the term salpingotomy (σάλπιγξ ; τομή, a cutting). The value of salpingostomy has not as yet been properly ascertained. There seems, however, to be little doubt that to afford any hope of success—that is of a subsequent pregnancy—it must be combined with salpingorrhaphy (σάλπιγξ; ῥαφή, a seam)—the suture of the pavilion of the tube to the ovary.

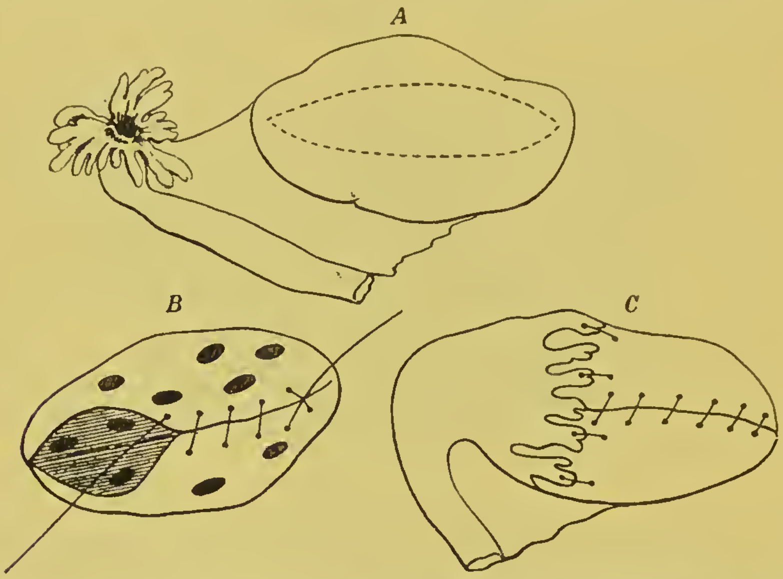


FIG. 221.—Resection of ovary, ignipuncture, and salpingorrhaphy. A. Outlines of incision in ovary. B. Suture of the resected area. Deep and superficial ignipuncture marks. C. The pavilion of the tube fixed to the ovary (Pozzi).

Indications.—Salpingostomy followed by salpingorrhaphy is indicated in catarrhal non-cystic conditions of the tube, in which the original ostium can be re-established, and in which the remainder of the tube is patulous, as proved by passing a probe through it into the uterus.

Instruments.—The instruments are the same as those required for salpingectomy, with the addition of a fine probe (*v.* page 382).

Operation.—The peritoneal cavity is opened either through the abdominal wall or the vagina, and the tube is freed from its adhesions and drawn out through the wound. An attempt is then made to reopen the ostium with a blunt probe, or if that fails by dividing the adherent fimbriæ with scissors. The tube is washed out, a probe is passed through it into the uterus in order to see that it is patent, and finally the ampulla is drawn as far as possible over the ovary and sutured there by a continuous catgut suture (*v.* Fig. 221, c).

OVARIOTOMY.

Ovariotomy (*ovarium*, an egg-holder; *τομή*, a cutting) is the term applied to the removal of the ovary for a new growth as distinguished from oöphorectomy, by which is meant the removal of the ovary for any condition other than a new growth. The term ovariotomy is also frequently loosely applied to the removal of cystic tumours of the broad ligament.

Indications.—Ovariotomy is indicated in the case of all malignant and papillary tumours of the ovary or broad ligament, which are not too far advanced to prevent their entire removal, and in the case of benign tumours which cannot be removed by resection (*v.* page 390).

Instruments.—The instruments required will be found under the head of ventral or vaginal cœliotomy (*v.* pages 236, 252).

Operation.—Small cystic or solid tumours of the ovary may be removed by the vaginal route. Large cystic or solid tumours must be removed by the abdominal route. It is with the latter operation, we are here alone concerned. As soon as the tumour has been exposed, the fingers or hand, according to the size of the opening in the abdominal wall, are passed into the peritoneal cavity in order to correct our original diagnosis, or to make it more definite by noting the following points:—

(1) The presence or absence of peritoneal adhesions.
(2) The relationship of the tumour to the pelvic and abdominal contents.

(3) The nature of the tumour, *i.e.* whether it is solid or cystic.

(4) If cystic, whether it is composed of one or more large cysts, or of an indefinite number of minute cysts.

As the details of the operation depend upon the answers to those questions, it will be well to discuss each of them separately.

(1) The presence or absence of peritoneal adhesions.—Adhesions may exist, and very frequently do exist, in the case of long-standing tumours, between the latter and the intestines, uterus, and parietal peritoneum. If these adhesions are recent, they can be easily broken down; but, if they are of long standing, they may convert what would have been otherwise an easy operation into one of extreme difficulty. Recent adhesions can be separated with the fingers, or can be wiped off with a sponge. Long string-like adhesions may be torn across or divided with a scissors. If vessels run in them, they must be tied on the peritoneal side of the division. Firm fibrous adhesions, between the intestines or uterus and the tumour, must be divided with the knife, the division being always made, in the case of intestino-ovarian adhesions, at the expense of the tumour. If such adhesions contain vessels, the bleeding must be checked by sewing over the cut surface with fine silk, and the same must be done if their separation involves the stripping of the peritoneal coat of the intestine. All parietal adhesions that can be reached must be broken down before the tumour is tapped, as they prevent the latter from being drawn outwards as it collapses, and so render more likely the escape of its contents into the peritoneal cavity.

(2) The relationship of the tumour to the pelvic and abdominal contents.—The relations of the tumour enable a diagnosis to be made between tumours of the ovary, of the uterus, or of any of the abdominal organs.

An ovarian tumour is moored to the floor of the pelvis at one or other side by the broad ligament, which has either been stretched out into the form of a pedicle, or which invests the tumour owing to the intra-ligamentous growth of the latter. If the tumour is pedunculated, it is—relatively to its size—more freely moveable than is an intra-ligamentous growth, and, at the same time, its area of attachment to the pelvic floor is very much narrower. It may not be possible—in the case of a large cystic tumour—to make out these points until the contents have been evacuated, but when this is done the relations of the broad ligament are easily seen.

(3) The nature of the tumour, *i. e.* whether it is cystic or solid.—It is as a rule an easy matter to determine whether the tumour is cystic or solid. If cystic, it can usually be so diminished by tapping that it can be drawn out through a small abdominal opening. If on the other hand it is solid, the abdominal opening must be extended sufficiently to permit of its removal *en masse*.

(4) If cystic, whether it is composed of one or more large cysts, or of an indefinite number of small ones.—This point is of importance and can be determined by the appearance and feel of the tumour. If an ovarian cyst is composed of one large loculus, its size can be reduced to a most marked extent by tapping, and the same can be said, when it is composed of several large or medium-sized cysts. But there are other cases in which the number of the cysts is apparently infinite, and in which the diminution brought about by continuing to tap them is so small as to be of very slight importance in comparison with the delay in the operation, the increased hæmorrhage, and the almost certain fouling of the peritoneal contents caused by such an attempt. Such cysts, as soon as it is obvious that they cannot be further reduced in size, should be treated as solid tumours, and removed *en masse*.

As soon as the foregoing points have been determined, the remaining steps of the operation, put shortly, consist in the following :—

(1) Separate all adhesions that can be reached.

(2) If the tumour is solid or micro-cystic increase the abdominal incision until it is sufficiently large to allow the tumour to be drawn out *en masse ;* if cystic, tap it in the following manner :—An assistant presses gently upon the antero-lateral faces of the tumour with his hands laid flat on the abdominal wall at either side of the incision. By this means the tumour is made to bulge outwards through the wound, and the abdominal wall is kept in close contact with it, so preventing the escape of fluid into the peritoneal cavity. With a scalpel, a small incision is then made in the centre of that part of the

cyst wall which bulges through the wound. The pressure exerted by the assistant drives the contents of the cyst through this opening in a steady stream, which can be directed into a basin. As the cyst collapses, the operator passes one blade of a stout clamp forceps, or of a Nélaton's cyst forceps, into the cyst, and, the other blade being outside, takes a firm hold of the wall. By means of this forceps, supplemented if necessary by others, the collapsing cyst is drawn gradually out of the abdomen.

(3) If the cyst is pedunculated, its pedicle is tied by interlocking sutures (*v.* Fig. 222); or, preferably, the vessels are ligated separately, and the cut edges of the pedicle brought together by a continuous catgut suture (*v.* page 383). If the cyst is found to be an intra-ligamentous growth, and consequently to have no pedicle, a pedicle must be formed for it in which the main blood-vessels will be included. This can usually be done by incising the peritoneal capsule of the tumour and stripping it off the latter until the base,—that is the portion which is not covered by peritoneum,—is reached. The blood-vessels enter at this point, and, if the cyst is drawn upwards, they will be put upon the stretch, and room will be given either to tie them *en masse*, or separately. Any excess of peritoneum is then cut away, and the edges brought together by means of a continuous catgut suture.

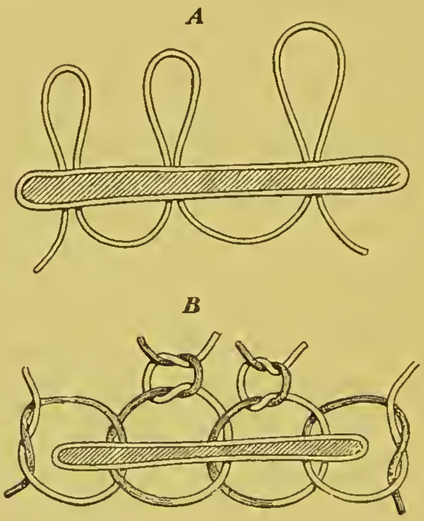


FIG. 222.—Method of tying a pedicle by three interlocking sutures. A. The sutures inserted. B. The loops cut, the ends crossed and tied.

Complications.—The most important complications which are met with in the course of an ovariotomy are :—

(1) Adhesions.—These are met with in all degrees of strength. Usually they can be easily broken down or divided, but on the other hand—though very rarely—they may be found to be so dense and numerous that they prevent the removal of the cyst wall.

(2) Fistulous openings between the cyst and any of the abdominal viscera.—If such are found to be present they must be closed, at the earliest possible moment.

(3) Twisted pedicle.—In some cases, as the cyst grows, the pressure of the abdominal walls and contents acts upon it in such a manner as to cause it to rotate, and so brings about a twisting of its pedicle. The chief danger of this condition during the operation is that as the cyst empties it tends to untwist itself, and, as this untwisting occurs, the opening in its wall may be carried away from the opening in the abdominal wall, so permitting an escape of the contents into the peritoneal cavity. This is an accident which can best be guarded against by seizing the cyst wall in clamp forceps, the moment after the incision through it has been made.

(4) Suppuration of the contents.—There is nothing to be said about this condition except to call attention to the extreme importance of guarding against any of the contents finding their way into the peritoneal cavity. If possible a tumour with suppurating contents should be removed entire, as is usually done in the case of a dermoid.

After-treatment.—The after-treatment of ovariotomy is the same as that of ventral or vaginal cœliotomy (*v.* pages 244, 261).

OÖPHORECTOMY—SALPINGO-OÖPHORECTOMY.

Oöphorectomy (*ὠόν*, an egg ; *φορέω*, I bear ; *ἐκτομή*, a cutting out) is the term applied to the removal of the ovary for any condition other than a new growth. Salpingo-oöphorectomy includes the removal of both ovary and tube.

Indications.—Oöphorectomy is indicated in the following conditions, when it is not possible to relieve such conditions by non-operative measures or to permanently cure them by puncture or resection of the ovary :—

(1) Oöphoritis, and ovarian abscess.
(2) Cirrhosis of the ovary. – i.e. Chronic Inflammatory &
(3) Certain cases of uterine fibro-myomata (*v.* page 137).

Salpingo-oöphorectomy is indicated when the tube is also diseased. 4 Tuberculous Disease

Instruments.—The instruments required are the same as for salpingectomy (*v.* page 381).

Operation.—The ovary is exposed by whatever route is considered most suitable, and is drawn, if possible, into the wound. It is then seized in a forceps, and drawn away from the broad ligament so as to put its attachments to the latter and to the uterus on the stretch. The utero-ovarian and infundibulo-pelvic ligaments are then tied separately with silk, and the ovary is cut away keeping as close to it as possible without leaving any tissue behind. If there is bleeding from the cut surface, it can be stopped by ligating any vessels which may spout. The divided edges of peritoneum are then sutured together by means of a continuous catgut suture.

Salpingo-oöphorectomy is performed in almost the same manner as salpingectomy (*v.* page 382). If a double ligature is used, the outermost ligature is tied below the ovary (*v.* Figs. 219, 220).

RESECTION OF THE OVARY AND IGNIPUNCTURE.

These two operations, which form so large a part of the conservative surgery of the ovary, can best be described together. By the term resection of the ovary is meant the excision of the diseased portion of the ovary, with the object of leaving the healthy portion. Ignipuncture is the term applied to the cauterisation of small cysts of the ovary, with the objects of destroying the cyst wall and leaving the healthy portions of the ovary behind.

Indications.—One or other operation, or sometimes both, are indicated under the following conditions, when palliative measures fail, and when it is possible to destroy or remove the diseased portion of ovary while still leaving a portion capable of carrying out its function:—

(1) Small benign tumours.
(2) Large cystic follicles.

(3) Cyst of the corpus luteum.
(4) Sclero-cystic oöphoritis.

Resection is indicated when the pathological condition is limited to a portion of the ovary, ignipuncture when the ovary is invaded more or less uniformly with small cysts.

Instruments.—The instruments are the same as those required for cœliotomy, ventral or vaginal as the case may be (*v.* pages 236, 252), with the addition of a Paquelin's thermo-cautery with a stiletto-shaped blade.

Operation.—To perform resection, the ovary is seized between the finger and thumb, and with a scalpel the part to be removed is marked out by means of an oval incision. The incisions are then carried downwards into the ovarian tissue, in such a manner that the whole of the diseased part is cut out; or, in the case of a cyst, the latter may be dissected out with scissors, or enucleated. The cut edges are then brought together by means of a continuous catgut suture, which is passed so as to include the entire depth of the wound. This also answers the purpose of checking hæmorrhage (Fig. 221, A, B).

For the purpose of ignipuncture, a Paquelin's thermo-cautery is used, with a sharp stiletto-shaped blade. It is heated to a cherry-red, and each cyst punctured with it in turn. The position of the cysts is determined, in the case of those which are superficial, by noting the manner in which they project above the surface of the ovary; in the case of those that lie more deeply, by the fact that the surface of the ovary is less, or perhaps more, resistent over them. If the ovary is much enlarged, it may be necessary to make an incision along its free border, extending at least half-way through the ovary itself. In this manner, deeply-placed cysts will be found. This incision must be afterwards closed with a continuous catgut suture.

CHAPTER XXIII.

OPERATIONS ON THE UTERINE LIGAMENTS AND PELVIC PERITONEUM.

Shortening of the Round Ligaments—Indications—Instruments—Operations; Extra-peritoneal Shortening, Intra-peritoneal Shortening—Complications—After-treatment. Vaginal Incision and Drainage—Indications—Instruments—Operation—After-treatment—Complications. Radical Treatment of Peritoneal Adhesions—Instruments—Operation—After-treatment.

SHORTENING OF THE ROUND LIGAMENTS.

Shortening of the round ligaments with the object of thus correcting retro-deviations of the uterus can be performed either extra-peritoneally (Alexander), or intra-peritoneally by the abdominal route (Dudley, Wylie) or by the vaginal route (Wertheim).

Indications.—Certain cases of retro-deviation of the uterus (*v.* page 89).

Instruments.—The instruments required for extra-peritoneal shortening are:—A scalpel, needle-holder, medium whole-curved needles, six clip-forceps, small toothed dissecting forceps, and a director with a hook at one end (*v.* Figs. 106, 107, 115). For intra-peritoneal shortening the instruments required are those given under the head of ventral or vaginal cœliotomy (*v.* pages 236, 252).

Operations.—The two classes of operation—extra- and intra-peritoneal—must be described separately.

Extra-peritoneal Shortening.—Extra-peritoneal shortening—Alexander's operation—is performed as follows:—An incision, two inches in length, is made through the skin and fat about half an inch above the pubic spine, and parallel to the course of the inguinal canal. By dissecting up the fat a little, the fibres of the external oblique are exposed. The external abdominal ring, through which the round ligament emerges, will be found either by looking for the small boss of fat which bulges through it, or by laying the tip of the finger on the pubic spine, when the ring will be felt immediately above and slightly external to the latter. The round ligament must next be found, a proceeding which is sometimes attended with a little difficulty, owing to the manner in which the fibres of the ligament are spread out and mingled with the surrounding cellular tissue. It may be recognised by looking for a small nerve which also emerges through the ring—the genital branch of the genito-crural nerve—directly under which it lies (*v.* Fig. 223). Owing to this difficulty, it has been recommended to open up the inguinal canal for a short distance, as the ligament will then be readily found lying in it (Lang, Schulz). The hooked director is then passed under the ligament in order to isolate it. A similar incision is made at the other side, and the ligament exposed and isolated in the same manner.

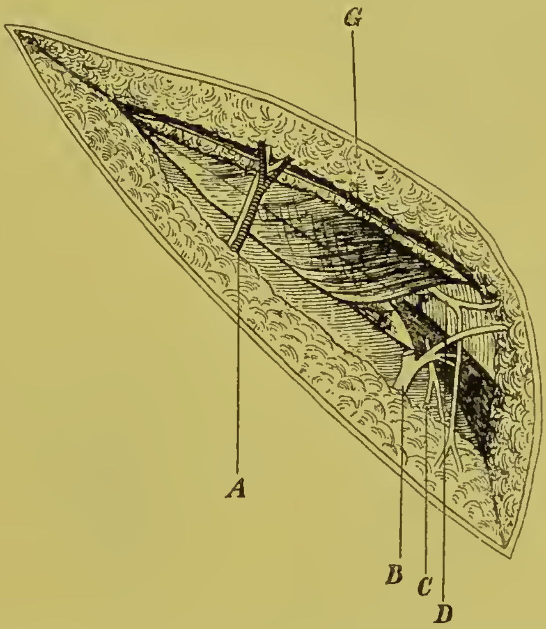


Fig. 223.—Relationships of the right round ligament at the external abdominal ring (Waldeyer). A. Superficial epigastric artery and vein. B. External pubic vein. C. External spermatic nerve. D.. Ileo-inguinal nerve. E. External pillar of external abdominal ring. F. Internal pillar of external abdominal ring. G. Superficial abdominal fascia. H. Round ligament.

The next step consists in placing the uterus in a normal position—if this has not been already done. This is best accomplished by the aid of a sound, which is held by an assistant in such a manner as to keep the fundus in front. Each ligament is caught in a clip forceps or in the fingers, and is drawn gently outwards until the effect of the traction is communicated to the sound. The usual amount thus pulled out is from four to six inches.

The next step consists in the fixing of the ligament in its new position. This is usually done by passing a silk suture through the ligament, and then through the aponeurosis of the external oblique. In addition, the inguinal canal—if it has been opened—and the external ring must be closed by means of a continuous catgut suture, in each loop of which it is well to include the ligament. The projecting piece of ligament is then cut off.

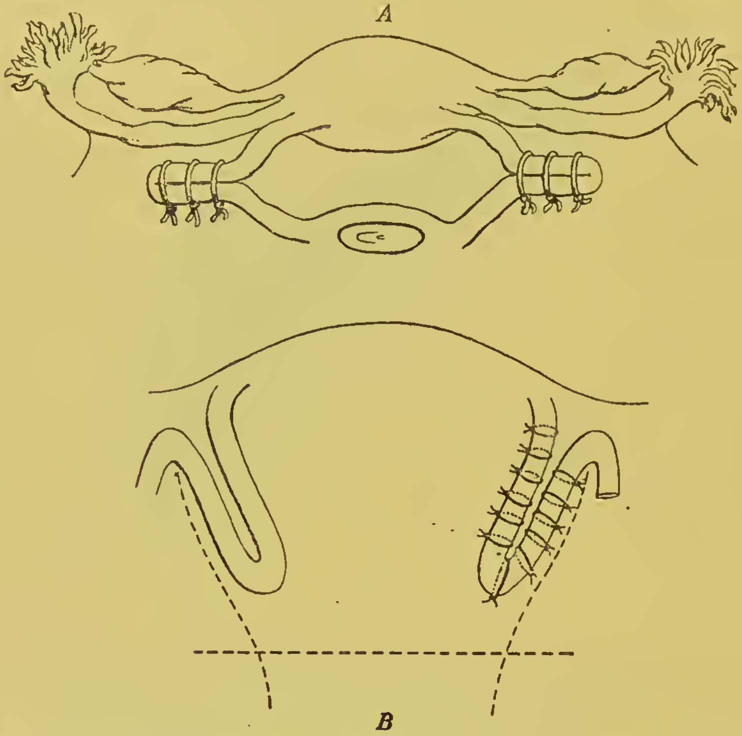


FIG. 224.—Intra-peritoneal shortening of the round ligaments. A. Wylie's method. B. Dudley's method. (Labadie-Lagrave.)

The last step consists in closing the wound by means of interrupted sutures of silkworm gut.

Intra-peritoneal Shortening.—Intra-peritoneal shortening can be performed by the abdominal or vaginal route. The former is specially indicated when, in addition to fixing the uterus in a normal position, it is also necessary to separate adhesions. Wylie, who operates by the abdominal route, catches the ligament in a forceps, and draws it outwards in such a manner as to double it on itself (*v.* Fig. 224, A). He then vivifies the inner face of this fold, and fixes the ligament in in this position by means of three encircling sutures. Dudley, also operating by the abdomen, vivifies first a portion of the anterior face of the uterus at either side, starting at the origin of the round ligaments, and extending to about a thumb's breadth above the vesical reflection of peritoneum. The round ligament, freed from its peritoneal investment, is then sutured in the form of a V-shaped loop to this area by means of catgut sutures (*v.* Fig. 224, B).

Wertheim's operation closely resembles Wylie's, except that it is performed by the vaginal route. It is for that reason to be preferred to the abdominal operation in the case of multiparæ in whom the vagina is relaxed.

Complications.—In extra-peritoneal shortening it may in some cases be very difficult or impossible to find the ligaments. This trouble can, however, be done away with by systematically opening the inguinal canal.

After-treatment.—After extra-peritoneal shortening the patient is kept in bed for three weeks, while the stitches in the abdominal wound are removed at the end of eight days. A pessary should be inserted immediately after the operation, and be worn for six weeks or two months. The after-treatment in cases of intra-peritoneal shortening is the same as that of ventral or vaginal cœliotomy as the case may be (*v.* pages 244, 261).

VAGINAL INCISION AND DRAINAGE.

Vaginal incision and drainage is of value in order to evacuate collections of pus from the pelvis, and to afford drainage from the most dependent part of the peritoneal cavity in septic peritonitis.

Indications.—Vaginal incision is indicated in the following cases:—

(1) Localised collections of pus in Douglas' pouch or between the layers of the broad ligament.

(2) Cases of pyosalpinx or ovarian abscess in which the diseased appendages cannot be removed, either owing to adhesions or to the inability of the patient to stand a serious operation. It is also indicated as a preliminary to the removal of the appendages, with the object of lessening the risk of infection of the peritoneal cavity.

(3) General septic peritonitis.

Instruments.—The following instruments are required:—A scalpel, or a pair of long-handled scissors with sharp points; Bozemann's catheter; posterior speculum; American forceps; a couple of clip forceps; long-handled plugging forceps (*v.* Figs. 7, 10, 104).

Operation.—Commence by examining the patient carefully, especially by the rectum, in order to determine the relationship between the abscess, the rectum, and the posterior vaginal fornix. Then expose the last, by passing a posterior speculum. If the cervix is low down and fairly moveable, it is of use to catch the posterior lip in an American forceps, and, by drawing the forceps downwards and forwards, so to place the mucous membrane of the fornix upon the stretch. A transverse incision is next made with the scalpel through the mucous membrane of the posterior fornix just behind the junction of the cervix and vagina, and about an inch in length (*v.* Fig. 121). In most cases, it will then be possible to push the finger through the wall of the abscess, and so make a passage for the pus. If this cannot be done, a sinus forceps can be introduced instead of the finger, and the opening enlarged by drawing the forceps out with its blades apart. Then, with one finger in the cavity, make a careful bimanual examination with the object of ascertaining the relationship of the abscess to the pelvic viscera, and the existence of secondary pus-containing loculi. All of these latter must be carefully broken down with the finger, but every precaution must be taken not to break through the adhesions which limit tho infection above. The cavity is then well washed out with creolin or other antiseptic, and plugged tightly with iodoform gauze. Usually, there is tolerably free hæmorrhage, but this will stop when a vaginal plug is applied in addition to the plug in the cavity, and supplemented by a firm compress and abdominal binder.

If the case is one of intra-ligamentous abscess which is pointing at some part of the abdominal wall, the course of procedure must be somewhat modified. Open the abscess first where it is pointing, and then in many cases a finger can be passed downwards through the cavity to the bottom of the pelvis. With the finger in this position, it will be possible to thrust up a forceps from the vagina into the cavity, without exposing the posterior fornix. The cavity can then be washed out by allowing a stream of water to run through it. In septic peritonitis, after abdominal cœliotomy and washing out of the peritoneal cavity, it is well to make a free opening into the vagina, in order to ensure good drainage.

Complications.—The principal complication which may occur is the wounding of the rectal wall while the incision is being made. If the opening is made too much to one side, there is a risk of wounding the ureter or uterine vessels.

After-treatment.—If the patient goes on well and her temperature is fairly normal, the gauze plug need not be removed for two or three days, but, if her temperature goes up, the plug must be removed the day subsequent to the operation. After it is removed, the cavity is well washed out and a fresh plug inserted. This treatment is continued, and in a few days the size of the cavity will have become so much lessened that it will be possible to dispense with the plug in the cavity, and only necessary to place some gauze in the vaginal opening in order to keep the latter patent.

RADICAL TREATMENT OF PERITONEAL ADHESIONS.

In a small proportion of cases, it may be necessary to open the abdominal cavity in order to break down adhesions between the uterine appendages and the surrounding parts. This can be done either by vaginal or ventral cœliotomy.

Indications.—Cœliotomy is indicated in order to break down adhesions when they give rise to any considerablo degree of pain, which cannot be relieved by less radical treatment (*v.*

page 198); or, when they cannot be broken down by Schultze's method (*v.* page 336). It is also indicated in the case of adhesions which cause chronic or acute intestinal obstruction.

Instruments.—The instruments are the same as those required for vaginal or ventral cœliotomy as the case may be (*v.* pages 236, 252).

Operation.—There are no very special points in the operation to call for remark. The abdominal cavity is opened by whatever route is thought best. Recent adhesions are broken down with the fingers. Fibrous adhesions of long standing are divided with the scalpel or scissors, bleeding vessels ligated, and the peritoneum brought together over the cut surface. If the uterus was in a position of retro-deviation before the operation, it should be fixed in front by performing ventral or vaginal hysteropexy. If the ovaries or tubes are adherent, they should be set free.

After-treatment.—The after-treatment is the same as that of vaginal or ventral cœliotomy as the case may be (*v.* pages 244, 261).

INDEX.

Abdominal cœliotomy, 235—247
— examination of patient, 5
— hysterectomy, 338—359
— — partial, 339—347
— — total, 347—359
— hysteropexy, 373—376
— — in prolapse, 77
— — in retro-deviations, 88
— myomectomy and enucleation, 139
— wound, suture of, 241—244
Adeno-fibromyoma, 124
Adenoma of cervix, 121
— of ovary, 182
— of tube, 174
— of uterus, 112, 124
Adenomatous endometritis, 112
Adhesive vaginitis, 43
Alexander's operation, 392
Amenorrhœa, 19, 20
— actual, 19, 20
— apparent, 19
— reflex, 20
— sympathetic, 20
American forceps, 12
Amputation of cervix, 308—314
— — in endocervicitis, 123
— — in prolapse, 76
Anteposition of uterus, 95
Anterior colporrhaphy, 305, 306
— — in prolapse, 76
— colpotomy, 253—259
— vaginal fixation, 376—379
— — — in prolapse, 77
— — — in retro-deviations, 88
Anteversion and flexion, 91—94
Antiseptic, definition, 227
Antiseptics, 232—234
Artificial vesico-vaginal fistula, to make, 274, 275
— — value of, in cystitis, 28
Ascent of ovary, 178
— of uterus, 67, 68
Aseptic, definition of, 227
Atmocausis, 327—332
— in acute endometritis, 107
— in hæmorrhagic endometritis, 117
— in tuberculosis of endometrium, 156
Atresia of genital passages, 216—219
Atrophic endometritis, 113
— oöphoritis, 167
uto-suggestion, amenorrhœa due to, 20

Backward displacements, 78—91
Bacterial theory of endometritis, 109, 110
Bandl's hollow sound, 117
Bartholin's gland, carcinoma of, 38
— — cyst of, 39
— — removal of, 280, 281
Bimanual examination, method of performing, 6—10
— reposition of retro-deviated uterus, 83—85
Bladder, cystitis, 25—28
— diseases of, 25—28
— fistulæ of, 210—215
— — operations for cure of, 264—274

Bladder, washing out of, 27, 28
Bozemann's catheter, 27
Braun's intra-uterine syringe, 117
Broad ligament, cysts of, 201—203
— — fibro-myomata of, 203
— — hæmatoma of, 203

Canal of Nuck, hydrocele of, 40
Carcinoma of clitoris, 38
— of ovary, 195
— of tube, 174
— of uterus, 140—149
— of vagina, 49, 50
— of vulva, 38
Castration for myoma, 137
Catarrhal salpingitis, 163
— vaginitis, 42—46
— vulvitis, 31, 32
Catgut, preparation of, 229–232
Cavernous myoma, 129
Cervical dilatation, 13, 14, 322—324
— dilators 13, 14
— metritis, 118—123
— — acute, 118, 119
— — chronic, 119—123
Cervix, amputation of, 308—314
— — infra-vaginal, 310—314
— — supra-vaginal, 308—310
— carcinoma of, 144—149
— dilatation of, 13, 14
— division of, 317—322
— ectropion of, 122, 123
— erosion of, 120—123
— inflammation of, 119—123
— laceration of, 208—210
— sarcoma of, 149—152
— suture of, 314, 315
Chorio-epithelioma, 153
Chorio-sarcoma, 153
Clitoris, amputation of, 279, 280
— malignant disease of, 38
Clever's crutch, 234
Cœliotomy, 235—261
— vaginal, 247—261
— ventral, 235–247
Colpocleisis, 306
— in vaginal fistulæ, 214
Colpo-perinæorrhaphy, 283—304
Colpo-perinæorrhaphy in prolapse, 76
Colpotomy, 247—261
— anterior, 247—259
— posterior, 259—261
Congenital absence of uterus, etc., 55
— atresiæ, 216—219
— atrophy of uterus, 57
— hypertrophy of cervix, 58
— stenosis of cervical canal, 55—58
Corporeal metritis, 104–118
— — acute, 104—107
— — chronic, 107—118
Curetting, 325—327
— as an aid to diagnosis, 13
— in endometritis, 116
— in myoma uteri, 136
— in salpingitis, 172
Cystitis, 25—28
Cystocele, 206
Cysts of Bartholin's gland, 39
— — removal of, 280, 281
— of broad ligament, 201—203
— of ovary, 181—194
— of vagina, 51, 52
— of vulva, 39

Deciduoma malignum, 153—155
Dermoid cysts, 182, 183, 190, 191
Descent of ovary, 178—180
— of uterus, 68—78
Dextroposition of uterus, 95—97
Dextroversion and flexion, 95—97
Diagnostic instruments, 11—15
— operations, 15
Diffuse intra-peritoneal hæmorrhage, 221
Dilatation of cervix, 13, 14
Displacements of ovaries, 177—180
— of uterus, 59—103
— — backward, 78—91
— — downward, 68—78
— — forward, 91—95
— — inversion, 97—103
— — list of, 67
— — torsion, 97
— — upward, 67, 68
Dissecting forceps, 115
Division of cervix, 317—322

Division of cervix, bilateral, 318, 319
— — posterior, 319 - 322
Double uterus, 55
Doyen's abdominal hysterectomy, 347—354
— anterior retractor, 236
— broad ligament clamps, 359
— crotchet, 348
— myoma extractor, 339
— ovarian extraction forceps, 252
— posterior speculum, 249
— retractor, 114
— vaginal hysterectomy, 367, 368
Drainage in cœliotomies, 238 – 241
— vaginal, 240
Dressings, sterilisation of, 228, 229
Dudley's operation for vesico-vaginal fistula, 268, 269
— posterior division of cervix, 320—322
— shortening of round ligaments, 395
Dührssen's anterior colpotomy, 259
— vaginal hysteropexy, 378
Dysmenorrhœa, 21—24
— cause of, in cervical stenosis, 22, 23
— exfoliative, 23
— membranous, 23

Ectropion, 122, 123
Eczema of vulva, 33—35
Electrolysis for myomata, 136, 137
Elephantiasis, 37
Emmet's trachelorrhaphy, 316, 317
Emphysematous vaginitis, 47, 48
Endometritis, acute, 105—107
— chronic, 109—118
— glandular, 112
— hæmorrhagic, 113
— interstitial, 112, 113
— mixed, 113
Endosalpingitis, 163
Enucleation of myomata, 139
Ergot in myomata, 135, 136
Erosion of cervix, 120—123
Exfoliative dysmenorrhœa, 23
— endometritis, 115
Extra-peritoneal hæmorrhage, 225, 226
Exudative vaginitis, 46, 47
— vulvitis, 32, 33

Fallopian tubes, diseases of, 157—176
— — inflammatory diseases of, 157—174
— — new growths of, 174
— — tubal pregnancy, 176
— — tuberculosis of, 174, 175
Ferguson's speculum, 11, 12
Fibro-adenoma of uterus, 124
Fibro-cystic tumour of uterus, 128, 129
Fibroma of ovary, 195
Fibro-myoma of broad ligament, 203
— — of round ligament, 203, 204
— — of uterus, 125—140
Fistula forceps, 251
Fistulæ, 210—215
— operations for, 264—274
Flexible rubber pessary, 73
Flexion of the uterus, definition of, 60
Follicular erosion, 121, 122
— hypertrophy of cervix, 122
Forward displacements of uterus, 91—95
Fungous endometritis, 113

Granular vaginitis, 43
— vulvitis, 31
Gynæcological couch, 6

Hæmatocele, 223, 224
Hæmatocolpos, 217
Hæmatoma of broad ligament, 225, 226
— of vagina, 53
— of vulva, 39
Hæmatometra, 217
Hæmatosalpinx, 165
Hands, sterilisation of, 232
Hegar's colpo-perinæorrhaphy, complete, 301—304
— — incomplete, 295—299
— curette, 325
— dilators, 14
Herniæ, 39, 40
— of ovary, 173
Herpes of vulva, 33
History of the patient, 1—5

Hodge pessary in prolapse, 74
— — in retro-deviations, 87, 88
Hollow vulcanite ring pessary, 74
Hydrocele of canal of Nuck, 40
Hydrops folliculi, 185
— tubæ profluens, 168
Hydrosalpinx, 163
Hypertrophic oöphoritis, 167
Hypertrophy of cervix, congenital, 58
Hysterectomy, 338—373
— in carcinoma uteri, 195
— in inversion, 103
— in myomata, 138
— in prolapse, 77
— in salpingo-oöphoritis, 173
— vaginal, 359—373
— ventral, 338—359
Hysteropexy, 373—379
— in prolapse, 77
— in retro-deviations, 88
— vaginal, 376—379
— ventral, 373—376

Ignipuncture of ovary, 174
Imperforate hymen, 216
— — excision of, 281
Infantile uterus, 57, 58
Inflammatory diseases of ovaries, 158—174
— — of tubes, 157—174
— — of uterus, 104—123
— — of vagina, 42—48
— — of vulva, 30—33
Inguinal hernia, 39
Instruments, sterilisation of, 229
Interstitial endometritis, 112, 113
— oöphoritis, acute, 166
— — chronic, 166, 167
— salpingitis, 163
Intra-peritoneal hæmorrhage, 220—225
Inversion of uterus, 97—103
— — acute, 98—100
— — chronic, 100—103
— — — radical cure of, 379, 380
Iodised phenol, 116
Iodoform gauze, as a means of dilating the cervix, 323

Kelly's colpo-perinæorrhaphy, 289—295
— cystoscope, 275—276
— hystero-myomectomy, 343—347
— ventral-hysteropexy, 374—376
Kolpo-hyperplasia cystica, 47
Küstner's operation for inversion, 103

Labio-vaginal herniæ, 40
Labium, tumours of, 38
— — removal of, 281
Laminaria tents, 13
Langhans' layer, 154
Lateral displacements of uterus, 95—97
Lawson Tait's perinæorrhaphy, complete, 299—301
— — incomplete, 283—287
— — scissors, 282

Mackenrodt's anterior colpotomy, 253—259
— operation for vesical fistulæ, 267—271
— vaginal hysteropexy, 376—378
Martin's colpo-perinæorrhaphy, 287—289
— curette, 326
— needle-holder, 250
— needles, 250
— posterior speculum, 249
— radical cure for prolapse, 77, 78
Massage in salpingo-oöphoritis, 172
Membranous dysmenorrhœa, 23
Menorrhagia, 21
— reflex, 21
Menstruation, 16—24
— pathology of, 19—24
— physiology of, 16—18
Metritis, 104—123
Metrorrhagia, 21
Meyer's ring pessary, 73, 74
Mickulicz's bag, 241
Microscope as an aid to diagnosis, 14, 15
Mixed cysts of ovary, 183
Morcellation of myomata, 140, 367—370
Mucoid cysts of ovary, 182

Müller's vaginal hysterectomy, 367, 368
Mycotic vaginitis, 45
Myoma of ovary, 195
— of tube, 174
— of uterus, 124—140
Myomectomy, 139
Myometritis, acute, 105
— chronic, 107—109

Nabothian follicle, 119, 120
Nodal cell, 190, 191
Normal positions of uterus, 63–67
Nott's speculum, 11, 12

Olshausen's pedicle needle, 251
Oöphorectomy, 389—390
— for myomata, 137
Oöphoritis, 165—167
— acute, 166
— chronic, 166, 167
Oöphoron, 180
Operating room, 228
— table, 234
Ovariotomy, 385—389
Ovary, displacements of, 177, 180
— inflammation of, 158—174
— new growths of, 180—195
— — — cystic, 181—194
— — — solid, 194, 195
— tuberculosis of, 196

Papillary erosion, 121
Papilloma of tube, 174
Parenchymatous metritis, *v.* Myometritis
— oöphoritis, 166
Paroöphoron, 180, 181
Parthenogenesis, 190
Patient, history of, 1—5
— physical examination of, 5—11
— preparation of, for operation, 232
Péan's hysterectomy forceps, 251
— vaginal hysterectomy, 368, 369
Péan-Segond's compression forceps, 339
Pedicle needles, 251
Pelvic cellulitis, 199—201
Pelvic examination of patient, 5—11
— peritonitis, 197—199
Perinæal hernia, 40
Perinæorrhaphy, 281—304
— complete, 299—304
— incomplete, 283–299
— in prolapse, 76
Perinæum, 41
— lacerations of, 207, 208
— operations on, 281—304
Peritoneal adhesions, cœliotomy for, 397, 398
— — Schultze's treatment of, 336, 337
Pessaries, 72—74
Phlegmonous vaginitis, 47
— vulvitis, 33
Physical examination of patient, 5—11
Post-operative complications, 246
Pozzi's ventral hysteropexy, 374
Procidentia uteri, 68—78
Prolapse of ovary, 178—180
— of urethral mucous membrane, 29, 263
— of uterus, 68—78, 206
— — to replace, 71
Proliferating cyst of ovary, 182, 186—190
Protargol, in acute metritis, 106
— in cystitis, 27
Pruritus vulvæ, 35–37
Pyosalpinx, 161

Quénu's vaginal hysterectomy, 367, 368

Rectocele, 206
Reflex amenorrhœa, 20
— menorrhagia, 21
Reposition of acute inversion of uterus, 99
— of chronic inversion, 101—103
— of prolapsed uterus, 71
— of retro-deviated uterus, 82—86
Repositor for inverted uterus, 102
Resection of ovary, 390, 391
Retention cysts of vulva, 39
— removal of, 280, 281
Retroposition of uterus, 90, 91
Retro-uterine hæmatocele, 220—225

Retroversions and flexions, 78—90
Rheinstädter's curette, 326
Ring pessary, 73, 74
Round ligaments, cysts of, 203
— — fibroma of, 203, 204
— — shortening of, extra-peritoneal, 392—394
— — — intra-peritoneal, 395
Rutherford Morison's operation for vesical fistula, 266—268

Salpingectomy, 381—383
Salpingitis, 159—174
— acute, 160—163
— chronic, 163—165
Salpingorrhaphy, 384
Salpingostomy, 384, 385
Salpingo-oöphorectomy, 389, 390
— for inflammation, 173
— for myomata, 137
Salpingo-oöphoritis, 158—174
Sänger's operation for vesico-vaginal fistula, 265, 266
— trachelorrhaphy, 314—317
— ventral-hysteropexy, 374
Sarcoma deciduo cellulare, 153
— of ovary, 195
— of tube, 174
— of uterus, 149—152
— of vagina, 50, 51
— of vulva, 38, 39
Schroeder's amputation of cervix, 311—313
— cervical zones, 70
— hysterectomy, 340—343
Schultze's method of replacing an adherent retro-deviation, 85, 86
Sea-tangle tents, 13, 14
Senile vaginitis, 43
Shortening of the round ligaments for prolapse, 77
— — for retro-deviation, 89
Silk, preparation of, 230
Silkworm gut, to prepare, 229, 230
Simon-Marckwald's amputation of cervix, 313, 314
Simple vaginitis, 43
— vulvitis, 31
Simpson's division of cervix, 318, 319
Sim's curette, 325
— operation for vesico-vaginal fistulæ, 264, 265
— posterior division of cervix, 319, 320
— treatment of inoperable malignant disease, 335, 336
— vaginal dilators, 49
Sinistroposition of uterus, 95—97
Sinistroversion and flexion, 95—97
Smith-Hodge pessary for prolapse, 74
— — for retro-deviation, 87, 88
Smyly's modification of Schultze's spoon-forceps, 334
Solid vulcanite ring pessary, 73, 74
Sound, uterine, 12, 13
Speculum, 11, 12
Sponge tents, 13
Sponges, 229
Stenosis of cervix, 55—57
Sterile, definition of, 227
Sterility, cause of, in anteflexion, 94
— — in cervical stenosis, 56
Sterilisation, definition of, 228
— of dressings, 228, 229
— of field of operation, 232
— of hands, 232
— of instruments, 229
— of sponges, 229
— of suture materials, 229—232
Submucous myoma, removal of, 333—335
Super-heated steam, use of, 327-332
Surgical cleanliness, definition of, 227, 228
Sympathetic amenorrhœa, 20
Syncytium, 154

Tents, 13, 14
Thomas's pessary, 72
Torsion of pedicle of ovarian cyst, 389
— of tube, 168
— of uterus, 97
Trachelorrhaphy, 314—317
— Emmet's, 316, 317
— in ectropion, 210
— Sänger's, 314—316

Traumatic lesions of genital tract, 205—215
— — of cervix, 208—210
— — of perinæum, 207
— — of vagina, 203—210
Trendelenburg's operation for vesical fistula, 271—273
Tubal pregnancy, 176
Tuberculosis of ovary, 196
— of tube, 174, 175
— of uterus, 155, 156
— of vagina, 53
— of vulva, 40
Tumours of ovary, 180—195
— of tube, 174
— of uterus, 124—155
— — benign, 124—140
— — malignant, 140—155
— of vagina, 49—53
— — false, 49—51
— — true, 51—53
— of vulva, 37—40
— — false, 37—39
— — true, 39, 40
Tupelo tents, 13
Tympanites, post-operative, 245, 246

Undescended ovary, 178
Ureteral fistulæ, 210—215, 274
Urethra, diseases of, 28, 29
— fistulæ of, 210—215, 274
— prolapse of mucous membrane, 29, 263
— vascular caruncle of, 28, 29
— — removal of, 262
Uterine sound, 12, 13
Uterus, backward displacements of, 78—91
— congenital absence of, 58
— — atrophy of, 57
— displacements of, 59—103
— double, 55
— downward displacements of, 68—78
— errors of development of, 54—58
— fibro-myomata of, 124—140
— fixation of, 373—379
— forward displacements of, 91—95
Uterus, infantile, 57, 58
— inflammatory diseases of, 104—123
— inversion of, 97—103
— lateral displacement of, 95—97
— major operations on, 338—380
— malignant growths of, 140—155
— minor operations on, 308—337
— new growths of, 124—156
— normal positions of, 63—67
— prolapse of, 68—78
— torsion of, 97
— tuberculosis of, 155, 156
— tumours of, 124—155
— upward displacement of, 67, 68

Vagina, diseases of, 42—53
— inflammation of, 42—48
— operations on, 281—307
— traumatic lesions of, 205—210
— tuberculosis of, 53
— tumours of, 49—53
Vaginal cœliotomy, 247—261
— — anterior, 247—259
— — posterior, 259—261
— drainage, 240, 395—397
— fluid, nature of, 43
— hysterectomy, 359—370
— — clamp operation, 365—367
— — Doyen's operation, 367, 368
— — Müller's operation, 367, 368
— — Péan's operation, 368, 369
— — Quénu's operation, 367, 368
— — Segond's operation, 369
— — suture operation, 360—364
— hysteropexy, 373—379
— — in prolapse, 76, 77
— — in retro-deviations, 88
— myomectomy and enucleation, 370—373
Vaginismus, 48, 49
Vaginitis, 42—48
— catarrhal, 42—46
— emphysematous, 47, 48
— exudative, 46, 47
— phlegmonous, 47
Vascular caruncle of urethra, 28, 29
— — removal of, 262

Veit-Schroeder gynæcological chair, 5, 6
Ventral cœliotomy, 235—247
— hysterectomy, 338—359
— hysteropexy, 373—376
— myomectomy and enucleation, 370—373
Version of the uterus, 59, 60
Vesico-cervical fistulæ, 273, 274
Vesico-uterine fistulæ, 273, 274
Vesico-vaginal fistulæ, 210—215
— — artificial, in cystitis, 28, 274, 275
— — operations for cure of, 264—273
— — — Dudley's, 268, 269
— — — Mackenrodt's, 269—271
— — — Rutherford Morison's, 266, 267
— — — Sängers', 265, 266
— — — Sim's, 264, 265
— — — Trendelenburg's, 271—273
Volsellum, large, 333
— small, 12
Vulva, diseases of, 30—41
— eczema of, 33—35
Vulva, elephantiasis of, 37
— herpes of, 33
— inflammation of, 30—33
— kraurosis of, 37
— operations on, 278—281
— pruritus of, 35, 36
— tuberculosis of, 40
— tumours of, 37—40
Vulvitis, 30
— catarrhal, 31, 32
— exudative, 32, 33
— granular, 31
— phlegmonous, 33
— simple, 31

Washing out bladder, method of, 27, 28
Werder's hysterectomy, 354—358
Wertheim's shortening of round ligaments, 395
Wylie's shortening of round ligaments, 395

Zestocausis, 327—322

UNIVERSITY OF LEEDS MEDICAL LIBRARY

PRINTED BY ADLARD AND SON, LONDON AND DORKING.

No. 3.

London, 7, *Great Marlborough Street*,
October, 1904.

A SELECTION
FROM
J. & A. CHURCHILL'S CATALOGUE,
COMPRISING
MOST OF THE RECENT WORKS PUBLISHED BY THEM.

N.B.—J. & A. Churchill's larger Catalogue, which contains over 600 *works, with a Complete Index to their Subjects, will be sent on application.*

Human Anatomy: A Treatise by various Authors. Edited by HENRY MORRIS, M.A., M.B. Lond., F.R.C.S., Senior Surgeon to the Middlesex Hospital. Third Edition. Roy. 8vo, with 846 Illustrations, nearly all original, and 267 in several colours, 30s. net.

Heath's Practical Anatomy: A Manual of Dissections. Ninth Edition. Edited by J. ERNEST LANE, F.R.C.S., Surgeon and Lecturer on Anatomy at St. Mary's Hospital. Crown 8vo, with 321 Engravings, 12s. 6d.

Wilson's Anatomist's Vade-Mecum. Eleventh Edition. By HENRY E. CLARK, F.F.P.S. Glasg., Examiner in Anatomy, F.P.S. Crown 8vo, with 492 Engravings and 26 Coloured Plates, 18s.

An Atlas of Human Anatomy. By RICKMAN J. GODLEE, M.S., F.R.C.S., Surgeon and late Demonstrator of Anatomy, University College Hospital. With 48 Imp. 4to Plates (112 figures), and a volume of Explanatory Text. £4 14s. 6d. net.

Human Osteology. By LUTHER HOLDEN, Consulting Surgeon to St. Bartholomew's Hospital. Eighth Edition, edited by CHARLES STEWART, F.R.S., Conservator of the Museum R.C.S., and ROBERT W. REID, M.D., F.R.C.S., Regius Professor of Anatomy in the University of Aberdeen. 8vo, with 59 Lithographic Plates and 74 Engravings. 16s.

Also.

Landmarks, Medical and Surgical. Fourth Edition. 8vo, 3s. 6d.

The Essentials of Regional Anatomy. By RICHARD J. BERRY, M.D., F.R.S.E., F.R.C.S.Edin., Lecturer on Anatomy in the New School of Medicine, Edinburgh. Second Edition. In three vols., 8vo, interleaved, 5s. each net.

A Manual of Practical Anatomy. By the late Prof. ALFRED W. HUGHES, M.B., M.C.Edin., Professor of Anatomy, King's College, London. Edited and completed by ARTHUR KEITH, M.D., Lecturer on Anatomy, London Hospital Medical College. In Three Parts, Roy. 8vo.

Part I., with 38 Coloured Plates and 116 Figures in the Text, 10s. 6d.

Part II., with 4 Coloured Plates and 151 Figures in the Text, 8s. 6d.

Part III., with 12 Coloured Plates and 204 Figures in the Text, 10s. 6d.

Anatomy of the Joints of Man. By HENRY MORRIS, Senior Surgeon to the Middlesex Hospital. With 44 Plates (several coloured). 8vo, 16s.

A Manual of General or Experimental Pathology, for Students and Practitioners. By W. S. LAZARUS-BARLOW, M.D., F.R.C.P., Director of the Cancer Research Laboratories, Middlesex Hospital. Second Edition. Royal 8vo, 21s. net.

By the same Author.

The Elements of Pathological Anatomy and Histology, for Students. With 7 Coloured Plates and 171 Figures in the Text. Roy. 8vo, 24s. net.

Pathological Anatomy of Diseases. Arranged according to the nomenclature of the R.C.P. Lond. By NORMAN MOORE, M.D., F.R.C.P., Assistant Physician to St. Bartholomew's Hospital. Fcap. 8vo, 111 Engravings, 8s. 6d.

A Manual of Clinical and Practical Pathology. By W. E. WYNTER, M.D., M.R.C.P., Assistant Physician to the Middlesex Hospital, and F. J. WETHERED, M.D., F.R.C.P., Assistant Physician to the Consumption Hospital, Brompton. With 4 Coloured Plates and 67 Engravings. 8vo, 12s. 6d.

The Pathologist's Handbook: A Manual of the Post-mortem Room. By T. N. KELYNACK, M.D., late Demonstrator in Morbid Anatomy, Owens College, Manchester. With 126 Illustrations, fcap. 8vo, pegamoid, 4s. 6d.

A Manual of Antenatal Pathology and Hygiene. The Fœtus. By J. W. BALLANTYNE, M.D., F.R.C.P.E., F.R.S.Edin., Lecturer on Antenatal Pathology and Teratology in the University of Edinburgh. With 69 Illustrations (14 Coloured), Royal 8vo, 20s. net.

The Human Brain: Histological and Coarse Methods of Research. By W. BEVAN LEWIS, Medical Superintendent, West Riding Asylum. 8vo, with Engravings and Photographs, 8s.

Elements of Human Physiology. By ERNEST H. STARLING, M.D., F.R.C.P., F.R.S., Jodrell Professor of Physiology in University College, London. Sixth Edition, much enlarged. With 321 Engravings, 8vo, 12s. 6d.

Essentials of Human Physiology, for Medical Students. By D. NOËL PATON, M.D., B.SC., Lecturer on Physiology, School of Medicine of the Royal Colleges, Edinburgh. With 110 Illustrations, 8vo, 12s. net.

Practical Physiological Chemistry. By J. A. MILROY, M.D., Demonstrator of Physiology, Queen's College, Belfast, and T. H. MILROY, M.D., F.R.S.E., Professor of Physiology, Queen's College, Belfast. 5s. net.

A Class Book of Practical Physiology. By DE BURGH BIRCH, M.D., Professor of Physiology in the Yorkshire College of the Victoria University. With 62 Illustrations, crown 8vo, 6s. 6d.

Practical Lessons in Elementary Biology, for Junior Students. By PEYTON T. B. BEALE, F.R.C.S., Lecturer on Elementary Biology and Demonstrator in Physiology in King's College, London. Crown 8vo, 3s. 6d.

Medical Jurisprudence: Its Principles and Practice. By ALFRED S. TAYLOR, M.D., F.R.C.P., F.R.S. Fourth Edition, by THOMAS STEVENSON, M.D., F.R.C.P., Lecturer on Medical Jurisprudence at Guy's Hospital. 2 vols. 8vo, with 189 Engravings, 31s. 6d.

Lectures on Medical Jurisprudence and Toxicology. By FRED. J. SMITH, M.D., F.R.C.P., Lecturer on Forensic Medicine and Toxicology at the London Hospital. Crown 8vo, 7s. 6d.

Hygiene and Public Health. By various Authors. Edited by Sir THOMAS STEVENSON, M.D., Lecturer on Chemistry and Medical Jurisprudence at Guy's Hospital; and SHIRLEY F. MURPHY, Medical Officer of Health of the County of London. In 3 vols., royal 8vo, fully Illustrated. Vol. I., 28s.; Vol. II., 32s.; Vol. III., 20s.

Manual of Hygiene. By W. H. HAMER, M.D., D.P.H., F.R.C.P., Lecturer on Public Health, St. Bartholomew's Hospital. With 93 Illustrations, 8vo, 12s. 6d. net.

The Theory and Practice of Hygiene. (Notter & Firth.) By J. LANE NOTTER, M.D., late Professor of Hygiene in the Army Medical School; and W. H. HORROCKS, M.B., B.Sc., Assistant Professor of Military Hygiene in the Staff Medical College. Second Edition. With 15 Plates and 134 other Illustrations, Royal 8vo, 25s.

A Handbook of Hygiene and Sanitary Science. By GEO. WILSON, M.D., F.R.S.E. Eighth Edition. Post 8vo, with Engravings, 12s. 6d.

Public Health and Preventive Medicine. By C. J. LEWIS, M.D., D.Sc. Edin., and ANDREW BALFOUR, M.D., B.Sc. Edin., D.P.H. Camb. With 11 Plates and 189 Figures in the Text. Imp. 8vo. 25s. net.

A Simple Method of Water Analysis, especially designed for the use of Medical Officers of Health. By JOHN C. THRESH, M.D.Vic., D.Sc. Lond., D.P.H.Camb. Fifth Edition. Fcap. 8vo, 2s. 6d.

By the same Author.

The Examination of Waters and Water Supplies. With 19 Plates and 11 Figures in the Text. Royal 8vo, 14s. net.

Elements of Health: an Introduction to the Study of Hygiene. By LOUIS C. PARKES, M.D., D.P.H. Post 8vo, with 27 Engravings, 3s. 6d.

Diet and Food considered in relation to Strength and Power of Endurance, Training and Athletics. By ALEXANDER HAIG, M.D., F.R.C.P. Fifth Edition. Crown 8vo, 2s. net.

The Prevention of Epidemics and the Construction and Management of Isolation Hospitals. By ROGER MCNEILL, M.D. Edin., D.P.H. Camb., Medical Officer of Health for the County of Argyll. 8vo. With several Hospital Plans, 10s. 6d.

Stretcher Drill Illustrated, including the New Hand-seat, Wagon and Railway Wagon Drills, compiled from the Manual of the Royal Army Medical Corps, 1904, Regulations for Army Medical Services, Field Service Manual A.M.S., King's Regulations, &c. By Major J. J. DE ZOUCHE MARSHALL, R.A.M.C.V. Second Edition. 3s. net.

A Manual of Bacteriology, Clinical and Applied. With an Appendix on Bacterial Remedies, &c. By RICHARD T. HEWLETT, M.D., Professor of General Pathology and Bacteriology in King's College, London, Lecturer on Bacteriology at the London School of Tropical Medicine. Second Edition. With 20 Plates and 66 Figures in the Text, post 8vo, 12s. 6d.

By the same Author.

Serum Therapy, Bacterial Therapeutics, and Vaccines. With 20 Figures. Crown 8vo, 5s. net.

Clinical Diagnostic Bacteriology, including Serum- and Cytodiagnosis. By ALFRED C. COLES, M.D., D.Sc., F.R.S.Edin. With 2 Coloured Plates, 8vo, 8s. net.

An Introduction to the Bacteriological Examination of Water. By W. H. HORROCKS, M.B., B.Sc. Lond., Assistant Professor of Military Hygiene in the Staff Medical College; Major, Royal Army Medical Corps. With 5 Plates, 8vo, 10s. 6d.

Mental Diseases: Clinical Lectures. By T. S. CLOUSTON, M.D., F.R.C.P. Edin., Lecturer on Mental Diseases in the University of Edinburgh. Sixth Edition. Crown 8vo, with 30 Plates, 14s. net.

The Insane and the Law: a Plain Guide for Medical Men, Solicitors, and Others. By G. PITT-LEWIS, K.C., R. PERCY SMITH, M.D., F.R.C.P., late Resident Physician, Bethlem Hospital, and J. A. HAWKE, B.A., Barrister-at-Law. 8vo, 14s.

A Dictionary of Psychological Medicine, giving the Definition, Etymology, and Synonyms of the Terms used in Medical Psychology; with the Symptoms, Treatment, and Pathology of Insanity; and THE LAW OF LUNACY IN GREAT BRITAIN AND IRELAND. Edited by D. HACK TUKE, M.D., LL.D., assisted by nearly 130 Contributors. 2 vols., 1,500 pages, royal 8vo, 42s.

The Force of Mind; or, the Mental Factor in Medicine. By ALFRED T. SCHOFIELD, M.D., Hon. Physician to Friedenheim Hospital. Second Edition. Crown 8vo, 5s. net.

By the same Author.

Unconscious Therapeutics; or, the Personality of the Physician. Crown 8vo, 5s. net.

The Mental Affections of Children, Idiocy, Imbecility, and Insanity. By WM. W. IRELAND, M.D. Edin., formerly Medical Superintendent of the Scottish Institution for the Education of Imbecile Children. Second Edition. With 21 Plates, 8vo, 14s.

The Journal of Mental Science. Published Quarterly, by Authority of the Medico-Psychological Association. 8vo, 5s.

Manual of Midwifery: Including all that is likely to be required by Students and Practitioners. By A. L. GALABIN, M.D., F.R.C.P., Consulting Obstetric Physician to Guy's Hospital. Sixth Edition. Post 8vo, with 329 Engravings, 14s. net.

The Practice of Midwifery: A Guide for Practitioners and Students. By D. LLOYD ROBERTS, M.D., F.R.C.P., Consulting Obstetric Physician to the Manchester Royal Infirmary, Physician to St. Mary's Hospital. Fourth Edition. Crown 8vo, with 2 Coloured Plates and 226 Woodcuts, 10s. 6d.

A Short Practice of Midwifery, embodying the Treatment adopted in the Rotunda Hospital, Dublin. By HENRY JELLETT, M.D., B.A.O. Dub., Ex-Assistant Master, Rotunda Hospital. Fourth Edition. With 152 Illustrations, crown 8vo, 8s. 6d.

By the same Author.

A Short Practice of Midwifery for Nurses. With 67 Illustrations, crown 8vo, 6s.

Obstetric Aphorisms: For the Use of Students commencing Midwifery Practice. By JOSEPH G. SWAYNE, M.D. Tenth Edition. Fcap. 8vo, with 20 Engravings, 3s. 6d.

Essentials of Obstetrics. By J. W. BALLANTYNE, M.D., F.R.C.P.E., F.R.S.E., Examiner in Midwifery in the University of Edinburgh. 5s. net.

Lectures on Obstetric Operations: A Guide to the Management of Difficult Labour. By ROBERT BARNES, M.D., F.R.C.P. Fourth Edition. 8vo, with 121 Engravings, 12s. 6d.

By the same Author.

A Clinical History of Medical and Surgical Diseases of Women. Second Edition. 8vo, with 181 Engravings, 28s.

Outlines of Gynæcological Pathology and Morbid Anatomy. By C. HUBERT ROBERTS, M.D., Lond., Physician to the Samaritan Free Hospital for Women. With 151 Illustrations, 8vo, 21s.

Manual of the Diseases peculiar to Women. By JAMES OLIVER, M.D., F.R.S. Edin., M.R.C.P. Lond., Physician to the Hospital for Diseases of Women, London. Fcap. 8vo, 3s. 6d

By the same Author.

Abdominal Tumours and Abdominal Dropsy in Women. Crown 8vo, 7s. 6d.

The Diseases of Women. By ALFRED L. GALABIN, M.A., M.D., F.R.C.P., Consulting Obstetric Physician to Guy's Hospital. Sixth Edition. 8vo, with 284 Engravings, 16s. net.

A Short Practice of Gynæcology. By HENRY JELLETT, M.D., B.A.O. Dub., Ex-Assistant Master, Rotunda Hospital, Dublin. Second Edition. With 225 Illustrations, 8vo., 10s. 6d.

Sterility. By ROBERT BELL, M.D., F.F.P. & S., Senior Physician to the Glasgow Hospital for Diseases peculiar to Women. 8vo, 5s.

Nursing, General, Medical, and Surgical, with Appendix on Sickroom Cookery. By WILFRED J. HADLEY, M.D., F.R.C.P., Physician to the London Hospital. Crn. 8vo, 3s. 6d.

Lessons in Disinfection and Sterilisation; an Elementary Course of Bacteriology, with Experiments. By F. W. ANDREWES, M.D., F.R.C.P., Lecturer on Pathology, St. Bartholomew's Hospital. With 31 Illustrations. Crown 8vo, 3s. net.

A Short Manual for Monthly Nurses. By CHARLES J. CULLINGWORTH, M.D., F.R.C.P., Obstetric Physician to St. Thomas's Hospital. Revised by the Author with the assistance of M. A. ATKINSON, Matron of the General Lying-in Hospital, Lambeth. Fifth Edition. Fcap. 8vo, 1s. 6d.

Lectures on Medicine to Nurses. By HERBERT E. CUFF, M.D., F.R.C.S., Superintendent, North Eastern Fever Hospital, London. Fourth Edition. With 29 Illustrations, 3s. 6d.

Antiseptic Principles for Nurses. By C. E. RICHMOND, F.R.C.S. 8vo, 1s.

A Practical Treatise on Disease in Children. By EUSTACE SMITH, M.D., F.R.C.P., Physician to the King of the Belgians, and to the East London Hospital for Children, &c. Second Edition. 8vo, 22s.

By the same Author.

Clinical Studies of Disease in Children. Second Edition. Post 8vo, 7s. 6d.

Also.

The Wasting Diseases of Infants and Children. Sixth (Cheap) Edition. Post 8vo, 6s.

The Diseases of Children. By JAS. F. GOODHART, M.D., F.R.C.P., Consulting Physician to the Evelina Hospital for Children. Seventh Edition, with the assistance of G. F. STILL, M.D., F.R.C.P., Assistant Physician to the Great Ormond St. Hospital for Children. 8vo, 12s. 6d. net.

On the Natural and Artificial Methods of Feeding Infants and Young Children. By EDMUND CAUTLEY, M.D., Physician to the Belgrave Hospital for Children. Second Edition. Crown 8vo, 7s. 6d.

A Pocket Guide to Anæsthetics for the Student and General Practitioner. By THOMAS D. LUKE, M.B., F.R.C.S.Ed. With 43 Engravings, crown 8vo, 5s. net.

Chloroform: A Manual for Students and Practitioners. By EDWARD LAWRIE, M.B. Edin., Lt.-Col. I.M.S., Residency Surgeon, Hyderabad. With Illustrations. Crown 4to, 5s. net.

Materia Medica, Pharmacy, Pharmacology, and Therapeutics. By W. HALE WHITE, M.D., F.R.C.P., Physician to, and Lecturer on Medicine at, Guy's Hospital. Eighth Edition, based upon the B.P. of 1898, and the Indian and Colonial Addendum. Fcap. 8vo, 7s. 6d.

An Introduction to the Study of Materia Medica, designed for Students of Pharmacy and Medicine. By HENRY G. GREENISH, F.I.C., F.L.S., Professor of Pharmaceutics to the Pharmaceutical Society. With 213 Illustrations. 8vo, 15s.

By the same Author.

The Microscopical Examination of Foods and Drugs, in the Entire, Crushed and Powdered States. With 168 Illustrations. 8vo 10s. 6d. net.

Also, with Mr. Eugène Collin.

An Anatomical Atlas of Vegetable Powders, designed as an Aid to the Microscopic Analysis of Powdered Foods and Drugs. With 138 Illustrations. 4to, 12s. 6d. net.

Practical Pharmacy: An Account of the Methods of Manufacturing and Dispensing Pharmaceutical Preparations; with a chapter on the Analysis of Urine. By E. W. LUCAS, F.C.S., Examiner at the Pharmaceutical Society. With 283 Illustrations. Royal 8vo, 12s. 6d.

Galenic Pharmacy: A Practical Handbook to the Processes of the British Pharmacopœia. By R. A. CRIPPS, M.P.S. 8vo, with 76 Engravings, 8s. 6d.

Practical Pharmacy. By Barnard S. Proctor, formerly Lecturer on Pharmacy at the College of Medicine, Newcastle-on-Tyne. Third Edition. 8vo, with 44 Wood Engravings and 32 Lithograph Fac-Simile Prescriptions, 14s.

A Companion to the British Pharmacopœia. By Peter Squire. Revised by Peter Wyatt Squire. Seventeenth Edition. 8vo, 12s. 6d.

By the same Authors.

Pocket Companion to the British Pharmacopœia. Fcap. 8vo, leather, 7s. 6d. net.

Also

The Pharmacopœias of thirty of the London Hospitals, arranged in Groups for Comparison. Seventh Edition. Fcap. 8vo, 6s.

The Galenical Preparations of the British Pharmacopœia: A Handbook for Medical and Pharmaceutical Students. By Charles O. Hawthorne, M.D., C.M., late Lecturer on Materia Medica, Queen Margaret College, Glasgow. 8vo, 4s. 6d.

The Pharmaceutical Formulary; a Synopsis of the British and Foreign Pharmacopœias. By Henry Beasley. Twelfth Edition (B.P. 1898), by J. Oldham Braithwaite. 18mo, 6s. 6d.

By the same Author.

The Druggist's General Receipt-Book. Tenth Edition. 18mo, 6s. 6d.

Also.

The Book of Prescriptions: Containing upwards of 3,000 Prescriptions from the Practice of the most eminent Physicians and Surgeons, English and Foreign. Seventh Edition. 18mo, 6s. 6d.

Selecta è Prescriptis: Containing Terms, Phrases, Contractions and Abbreviations used in Prescriptions, with Explanatory Notes, &c. Also, a Series of Abbreviated Prescriptions with Translations and Key. By J. Pereira, M.D., F.R.S. Eighteenth Edition, by Joseph Ince, F.C.S., F.L.S. 24mo, 5s.

Year-Book of Pharmacy: Containing the Transactions of the British Pharmaceutical Conference. Annually. 8vo, 10s.

Southall's Organic Materia Medica: a Handbook treating of some of the more important of the Animal and Vegetable Drugs made use of in Medicine, including the whole of those contained in the B.P. Sixth and Enlarged Edition. By John Barclay, B.Sc. Lond. 8vo, 7s. 6d.

Manual of Botany. By J. Reynolds Green, Sc.D., M.A., F.R.S., Professor of Botany to the Pharmaceutical Society. Two Vols. Cr. 8vo.

Vol. I.—Morphology and Anatomy. Third Edition. With 778 Engravings, 7s. 6d.

,, II.—Classification and Physiology. Second Edition. With 466 Engravings, 10s.

By the same Author.

An Introduction to Vegetable Physiology. With 184 Illustrations, 8vo, 10s. 6d.

Medicinal Plants: Being descriptions, with original figures, of the Principal Plants employed in Medicine, and an account of their Properties and Uses. By Prof. Bentley and Dr. H. Trimen, F.R.S. In 4 vols., large 8vo, with 306 Plates (not coloured), cloth binding, £5 5s. net.

The Student's Guide to Systematic Botany, including the Classification of Plants and Descriptive Botany. By Robert Bentley. Fcap. 8vo, with 350 Engravings, 3s. 6d.

Therapeutic Electricity and Practical Muscle Testing. By W. S. Hedley, M.D., in charge of the Electro-therapeutic Department of the London Hospital. With 110 Illustrations. Royal 8vo, 8s. 6d.

Practical Therapeutics: A Manual. By Edward J. Waring, C.I.E., M.D., F.R.C.P., and Dudley W. Buxton, M.D., B.S. Lond. Fourth Edition. Crown 8vo, 14s.

By the same Author.

Bazaar Medicines of India, And Common Medical Plants: With Full Index of Diseases, indicating their Treatment by these and other Agents procurable throughout India, &c. Fifth Edition. Fcap. 8vo, 5s.

Climate and Fevers of India, with a series of Cases. By Sir Joseph Fayrer, Bart., K.C.S.I., M.D. 8vo, with 17 Temperature Charts, 12s.

The Malarial Fevers of British Malaya. By Hamilton Wright, M.D. (McGill), Director of the Institute for Medical Research, Federated Malay States. With Map and Charts, Roy. 8vo, 3s. net.

By the same Author.

The Etiology and Pathology of Beri-beri. With Map and Charts. Royal 8vo, 3s. net.

Beri-beri: its Symptoms and Symptomatic Treatment. An Essay printed by the Board of Trinity College, Dublin, for the Author. By PERCY N. GERRARD, M.D., District Surgeon, Federated Malay States Civil Service. 8vo, 2s. 6d. net.

By the same Author.

Extracts from the Above. Crown 8vo, 1s. 6d. net.

A Manual of Family Medicine and Hygiene for India. Published under the Authority of the Government of India. By Sir WILLIAM J. MOORE, K.C.I.E., M.D. Seventh Edition, revised by Major J. H. TULL WALSH, I.M.S. Post 8vo, with 70 Engravings, 12s.

By the same Author.

A Manual of the Diseases of India: With a Compendium of Diseases generally. Second Edit. Post 8vo, 10s.

The Prevention of Disease in Tropical and Sub-Tropical Campaigns. (Parkes Memorial Prize for 1886.) By Lieut.-Col. ANDREW DUNCAN, M.D., B.S. Lond., F.R.C.S., Indian Medical Service. 8vo, 12s. 6d.

A Text-book of Medicine. Begun by the late C. HILTON FAGGE, M.D., and completed and rewritten by P. H. PYE-SMITH, M.D., F.R.S. Fourth Edition. 2 vols. Royal 8vo. 42s.

Manual of the Practice of Medicine. By FREDERICK TAYLOR, M.D., F.R.C.P., Physician to, and Lecturer on Medicine at, Guy's Hospital. Seventh Edition. 8vo, with Engravings, 15s. net.

A System of Clinical Medicine for Practitioners and Students, giving an Account of the Diagnosis, Prognosis, and Treatment of Disease. By THOS. D. SAVILL, M.D., M.R.C.P. In 2 vols. With 4 Coloured Plates and about 200 Figures in the Text. Vol. I., Local Diseases and Pyrexial Disorders. 8vo, 12s. 6d. net. Vol. II., Diseases of the Skin, the Nervous System, etc. (shortly).

The Practice of Medicine. By M. CHARTERIS, M.D., Professor of Therapeutics and Materia Medica in the University of Glasgow. Eighth Edition. Edited by F. J. CHARTERIS, M.B., Ch.B. Crown 8vo, with Engravings on Copper and Wood, 10s.

A Dictionary of Practical Medicine. By various writers. Edited by JAS. KINGSTON FOWLER, M.A., M.D., F.R.C.P., Physician to Middlesex Hospital and the Hospital for Consumption. 8vo, 21s.

A Text-Book of Bacteriology, for Medical Students and Practitioners. By G. M. STERNBERG, M.D., Surgeon-General, U.S. Army. Second Edition. With 9 Plates and 198 Figures in the Text. 8vo, 26s.

How to Examine the Chest: A Practical Guide for the use of Students. By SAMUEL WEST, M.D., F.R.C.P., Physician to St. Bartholomew's Hospital. Third Edition. With 46 Engravings. Fcap. 8vo, 5s.

An Atlas of the Pathological Anatomy of the Lungs. By the late WILSON FOX, M.D., F.R.S., F.R.C.P., Physician to H.M. the Queen. With 45 Plates (mostly Coloured) and Engravings. 4to, half-bound in Calf, 70s. net.

By the same Author.

A Treatise on Diseases of the Lungs and Pleura. Edited by SIDNEY COUPLAND, M.D., F.R.C.P., Physician to Middlesex Hospital. Roy. 8vo, with Engravings; also Portrait and Memoir of the Author, 36s. net.

On Syphonage and Hydraulic Pressure in the Large Intestine, with their bearing upon the Treatment of Constipation, Appendicitis, etc. By R. W. LEFTWICH, M.D. Crown 8vo, 3s. net.

Uric Acid as a Factor in the Causation of Disease. By ALEXANDER HAIG, M.D., F.R.C.P., Physician to the Metropolitan Hospital and the Royal Hospital for Children and Women. Sixth Edition. With 75 Illustrations, 8vo, 15s.

By the same Author.

Uric Acid: An Epitome of the Subject. 2s. 6d. net.

The Blood: How to Examine and Diagnose its Diseases. By ALFRED C. COLES, M.D., D.Sc., F.R.S. Edin. Second Edition. With 6 Coloured Plates. 8vo, 10s. 6d.

The Physiology of the Carbohydrates; their Application as Food and Relation to Diabetes. By F. W. PAVY, M.D., LL.D., F.R.S., F.R.C.P., Consulting Physician to Guy's Hospital. Royal 8vo, with Plates and Engravings, 10s. 6d.

Arhythmia of the Heart, A Physiological and Clinical Study. By Dr. K. F. WENCKEBACH, Professor of Medicine, Groningen. Translated by THOMAS SNOWBALL, M.A., M.D. Illustrated. Royal 8vo, 12s. net.

Bronchial Asthma: Its Pathology and Treatment. By J. B. BERKART, M.D., late Physician to the City of London Hospital for Diseases of the Chest. Second Edition, with 7 Plates (35 Figures). 8vo, 10s. 6d.

Medical Diagnosis (Student's Guide). By SAMUEL FENWICK, M.D., F.R.C.P., and W. SOLTAU FENWICK, M.D., B.S. Ninth Edition. Crown 8vo, with 139 Engravings, 9s.

By the same Authors.

Outlines of Medical Treatment. Fourth Edition. Crown 8vo, with 35 Engravings, 10s.

Also.

Ulcer of the Stomach and Duodenum. With 55 Illustrations. Royal 8vo, 10s. 6d. *Also.*

Cancer and other Tumours of the Stomach. With 70 Illustrations. Roy. 8vo, 10s. 6d.

The Liver. By LIONEL S. BEALE, M.B., F.R.S., Consulting Physician to King's College Hospital. With 24 Plates (85 Figures). 8vo, 5s.

By the same Author.

On Slight Ailments: And on Treating Disease. Fourth Edition. 8vo, 5s.

Text-Book of Medical Treatment (Diseases and Symptoms). By NESTOR I. C. TIRARD, M.D., F.R.C.P., Professor of the Principles and Practice of Medicine, King's College, London. 8vo, 15s.

The Schott Methods of the Treatment of Chronic Diseases of the Heart, with an account of the Nauheim Baths and of the Therapeutic Exercises. By W. BEZLY THORNE, M.D., M.R.C.P. Fourth Edition. 8vo, with Illustrations, 6s.

Guy's Hospital Reports. By the Medical and Surgical Staff. Vol. XLIII. Third Series. 8vo, 10s. 6d.

St. Thomas's Hospital Reports. By the Medical and Surgical Staff. Vol. XXXI. New Series. 8vo, 8s. 6d.

Medical Ophthalmoscopy: A Manual and Atlas. By SIR WILLIAM R. GOWERS, M.D., F.R.C.P., F.R.S. Fourth Edition. Edited with the assistance of MARCUS GUNN, M.B., F.R.C.S. With Autotype Plates and Woodcuts. 8vo, 14s. net.

By the same Author.

A Manual of Diseases of the Nervous System. Roy. 8vo.

Vol. I. Nerves and Spinal Cord. Third Edition by the Author and JAMES TAYLOR, M.D., F.R.C.P. With 192 Engravings, 15s.

Vol. II. Brain and Cranial Nerves: General and Functional Diseases. Second Edition. With 182 Engravings, 20s.

Also.

Clinical Lectures on Diseases of the Nervous System. 8vo, 7s. 6d.

Subjective Sensations of Sight and Sound, Abiotrophy, and other Lectures on Diseases of the Nervous System. By Sir WILLIAM R. GOWERS, M.D., F.R.S. With 18 Illustrations. 8vo, 6s. net.

By the same Author.

Epilepsy and other Chronic Convulsive Diseases: their Causes, Symptoms, and Treatment. Second Edition. 8vo, 10s. 6d.

Also.

Diagnosis of Diseases of the Brain. Second Edition. 8vo, with Engravings, 7s. 6d.

Also.

Syphilis and the Nervous System. Lettsomian Lectures for 1890. 8vo, 4s.

The Nervous System, Diseases of. By J. A. ORMEROD, M.D., F.R.C.P., Physician to the National Hospital for the Paralysed and Epileptic. With 66 Illustrations. Fcap. 8vo, 8s. 6d.

Text-Book of Nervous Diseases, for Students and Practitioners of Medicine. By CHARLES L. DANA, M.D., Professor of Nervous and Mental Diseases in Bellevue Hospital Medical College, New York. Fourth Edition, with 246 Illustrations, 8vo, 20s.

Handbook of the Diseases of the Nervous System. By JAMES ROSS, M.D., F.R.C.P., Professor of Medicine in the Victoria University, and Physician to the Royal Infirmary, Manchester. Roy. 8vo, with 184 Engravings, 18s.

Diseases of the Nervous System. Lectures delivered at Guy's Hospital. By SIR SAMUEL WILKS, BART., M.D., F.R.S. Second Edition. 8vo, 18s.

Stammering: Its Causes, Treatment, and Cure. By A. G. BERNARD, M.R.C.S., L.R.C.P. Crown 8vo, 2s.

Diseases of the Nervous System. Clinical Lectures. By THOMAS BUZZARD, M.D., F.R.C.P., Physician to the National Hospital for the Paralysed and Epileptic. With Engravings, 8vo. 15s.

By the same Author.

Some Forms of Paralysis from Peripheral Neuritis: of Gouty, Alcoholic, Diphtheritic, and other origin. Crown 8vo, 5s.

Also.

On the Simulation of Hysteria by Organic Disease of the Nervous System. Crown 8vo, 4s. 6d.

Gout in its Clinical Aspects. By J. MORTIMER GRANVILLE, M.D. Crown 8vo, 6s.

Rheumatic Diseases, (Differentiation in). By HUGH LANE, Surgeon to the Royal Mineral Water Hospital, Bath, and Hon. Medical Officer to the Royal United Hospital, Bath. Second Edition, much Enlarged, with 8 Plates. Crown 8vo, 3s. 6d.

Diseases of the Abdomen, Comprising those of the Stomach and other parts of the Alimentary Canal, Œsophagus, Cæcum, Intestines, and Peritoneum. By S. O. HABERSHON M.D., F.R.C.P. Fourth Edition. 8vo, with 5 Plates, 21s.

On Gallstones, or Cholelithiasis. By E. M. BROCKBANK, M.D. Vict., M.R.C.P. Lond., Honorary Physician to the Ancoats Hospital, Manchester. Crown 8vo, 7s.

Obstinate Hiccough: the Physiology, Pathology, and Treatment, based on a collection of over 150 Cases from British and Foreign Works. By L. F. B. KNUTHSEN, M.D. Edin. Roy. 8vo, 6s.

Headaches: Their Nature, Causes, and Treatment. By W. H. DAY, M.D., Physician to the Samaritan Hospital. Fourth Edition. Crown 8vo, with Engravings, 7s. 6d.

A Handbook of Medical Climatology. By S. EDWIN SOLLY, M.D., late President of the American Climatological Association. With Engravings and Coloured Plates, 8vo., 16s.

Illustrated Ambulance Lectures: To which is added a NURSING LECTURE. By JOHN M. H. MARTIN, M.D., F.R.C.S., Honorary Surgeon to the Blackburn Infirmary. Fourth Edition. Crown 8vo, with 60 Engravings, 2s.

Surgery: its Theory and Practice. By WILLIAM J. WALSHAM, F.R.C.S., Surgeon to St. Bartholomew's Hospital. Eighth Edition. By W. G. SPENCER, F.R.C.S., Surgeon to the Westminster Hospital. 8vo, with 622 Engravings, 18s. net.

A Synopsis of Surgery. By R. F. TOBIN, Surgeon to St. Vincent's Hospital, Dublin. Second Edition. Crown 8vo, interleaved, leather binding, 6s. 6d.

A Manual of Surgical Diagnosis. By JAMES BERRY, B.S.Lond., F.R.C.S., Surgeon to, and Lecturer on Surgery at, the Royal Free Hospital. 6s. net.

Hare-lip and Cleft Palate. By R. W. MURRAY, F R.C.S., Surgeon, David Lewis Northern Hospital, late Surgeon Infirmary for Children, Liverpool. With 25 Illustrations, 8vo, 3s.

Operations on the Brain (A Guide to). By ALEC FRASER, Professor of Anatomy, Royal College of Surgeons in Ireland. Illustrated by 42 life-size Plates in Autotype, and 2 Woodcuts in the text. Folio, 63s. net.

Abdominal Surgery. By J. GREIG SMITH, M.A., F.R.S.E. Sixth Edition. Edited by JAMES SWAIN, F.R.C.S., Assistant Surgeon to the Bristol Royal Infirmary, Professor of Surgery, University College, Bristol. Two Vols., 8vo, with 224 Engravings, 36s.

Muco-Membranous Entero-Colitis; Symptoms, Complications, Etiology and Treatment By MAURICE DE LANGENHAGEN, M.D., Consulting Physician at Plombières, Vosges, France. Fcap. 8vo, 3s. 6d.

The Operations of Surgery: Intended for Use on the Dead and Living Subject alike. By W. H. A. JACOBSON, M.Ch. Oxon., F.R.C.S., Surgeon, Guy's Hospital; and F. J. STEWARD, M.S. Lond., F.R.C.S., Assistant Surgeon, Guy's Hospital. Fourth Edition. 2 vols. Royal 8vo, with 550 Illustrations, 42s.

A Course of Operative Surgery. By CHRISTOPHER HEATH, Surgeon to University College Hospital. Second Edition. With 20 coloured Plates (180 figures) from Nature by LÉVEILLÉ, and several Woodcuts. Large 8vo, 30s. net.

By the same Author.

A Manual of Minor Surgery and Bandaging. For the use of House-Surgeons, Dressers, and Junior Practitioners. Twelfth Edition, revised by BILTON POLLARD, F.R.C.S., Surgeon to University College Hospital. Fcap. 8vo, with 195 Engravings, 6s. 6d.

Also.

Injuries and Diseases of the Jaws. Fourth Edition. By HENRY PERCY DEAN, M.S., F.R.C.S., Assistant Surgeon to the London Hospital. 8vo, with 187 Wood Engravings, 14s.

Also.

Clinical Lectures on Surgical Subjects, delivered at University College Hospital. First Series, 6s.; Second Series, 6s.

Modern Bullet Wounds and Modern Treatment, with Special Regard to Long Bones and Joints, Field Appliances and First Aid. Part of the Alexander Essay for 1903. By Major F. SMITH, D.S.O., R.A.M.C. Crown 8vo, 3s. net.

The Practice of Surgery: A Manual. By THOMAS BRYANT, Consulting Surgeon to Guy's Hospital. Fourth Edition. 2 vols. crown 8vo, with 750 Engravings (many being coloured), and including 6 chromo plates. 32s.

Surgical Emergencies: Together with the Emergencies attendant on Parturition and the Treatment of Poisoning. By PAUL SWAIN, F.R.C.S., Surgeon to the South Devon and East Cornwall Hospital. Fifth Edition. Crown 8vo, with 149 Engravings, 6s.

Clinical Essays and Lectures. By HOWARD MARSH, F.R.C.S., Professor of Surgery in the University of Cambridge, late Surgeon to St. Bartholomew's Hospital. With 26 Illustrations. 8vo, 7s. 6d.

The Surgery of the Alimentary Canal. By ALFRED ERNEST MAYLARD, M.B. Lond. and B.S., Surgeon to the Victoria Infirmary, Glasgow. With 27 Swantype Plates and 89 Figures in the text, 8vo, 25s.

By the same Author.

A Student's Handbook of the Surgery of the Alimentary Canal. With 97 Illustrations. Crown 8vo, 8s. 6d.

Ovariotomy and Abdominal Surgery. By HARRISON CRIPPS, F.R.C.S., Surgical Staff, St. Bartholomew's Hospital. With numerous Plates, 8vo, 25s.

The Physiology of Death from Traumatic Fever; A Study in Abdominal Surgery. By JOHN D. MALCOLM, M.B., C.M., F.R.C.S.E., Surgeon to the Samaritan Free Hospital. 8vo, 3s. 6d.

Surgical Pathology and Morbid Anatomy. By ANTHONY A. BOWLBY, F.R.C.S., Surgeon to St. Bartholomew's Hospital. Fourth Edition. Crown 8vo, with 186 Engravings, 10s. 6d.

By the same Author.

Injuries and Diseases of Nerves and their Surgical Treatment. 8vo, with 20 Plates, 14s.

Diseases of the Thyroid Gland and their Surgical Treatment. By JAMES BERRY, B.S.Lond., F.R.C.S., Surgeon to the Royal Free Hospital and Lecturer on Surgery at the London School of Medicine for Women. With 121 Illustrations, 8vo, 14s.

Short Manual of Orthopædy. By HEATHER BIGG, F.R.C.S. Ed. Part I. Deformities and Deficiencies of the Head and Neck. 8vo, 2s. 6d.

The Human Foot: Its Form and Structure, Functions and Clothing. By THOMAS S. ELLIS, Consulting Surgeon to the Gloucester Infirmary. With 7 Plates and Engravings (50 Figures). 8vo, 7s. 6d.

Face and Foot Deformities. By FREDERICK CHURCHILL, C.M. 8vo, with Plates and Illustrations, 10s. 6d.

Royal London Ophthalmic Hospital Reports. By the Medical and Surgical Staff. Vol. XVI., Part 1. 8vo, 5s.

Ophthalmological Society of the United Kingdom. Transactions, Vol. XXIII. 8vo, 12s. 6d. net.

Manual of Ophthalmic Surgery and Medicine. By W. H. H. JESSOP, M.A., F.R.C.S., Ophthalmic Surgeon to St. Bartholomew's Hospital. With 5 Coloured Plates and 110 Woodcuts, crown 8vo, 9s. 6d.

Nettleship's Diseases of the Eye: A Manual for Students. Sixth Edition, revised and edited by W. T. HOLMES SPICER, M.B., F.R.C.S., Ophthalmic Surgeon to St. Bartholomew's Hospital, Surgeon to the Royal London Ophthalmic Hospital. With 161 Engravings and a Coloured Plate illustrating Colour-Blindness, crown 8vo, 8s. 6d.

Diseases and Refraction of the Eye. By N. C. MACNAMARA, F.R.C.S., Surgeon to Westminster Hospital, and GUSTAVUS HARTRIDGE, F.R.C.S., Surgeon to the Royal Westminster Ophthalmic Hospital. Fifth Edition. Crown 8vo, with Plate, 156 Engravings, also Test-types, 10s. 6d.

Diseases of the Eye: a Practical Handbook for General Practitioners and Students. By CECIL EDWARD SHAW, M.D., M.Ch., Ophthalmic Surgeon to the Ulster Hospital for Children and Women, Belfast. With a Test-Card for Colour-Blindness. Crown 8vo, 3s. 6d.

Practical Handbook of the Diseases of the Eye. By CHALMERS WATSON, M.B., M.R.C.P.E. Second Edition. With 9 Coloured Plates and 31 Figures in the Text. Fcap. 8vo, 5s. net.

Refraction of the Eye: A Manual for Students. By GUSTAVUS HARTRIDGE, F.R.C.S., Surgeon to the Royal Westminster Ophthalmic Hospital. Twelfth Edition. Crown 8vo, with 105 Illustrations, also Test-types, &c., 6s.

By the same Author.

The Ophthalmoscope: A Manual for Students. Fourth Edition. Crown 8vo, with 65 Illustrations and 4 Plates. 4s. 6d.

Methods of Operating for Cataract and Secondary Impairments of Vision, with the results of 500 cases. By Major G. H. FINK, H.M. Indian Medical Service. Crown 8vo, with 15 Engravings, 5s.

Elementary Ophthalmic Optics, including Ophthalmoscopy and Retinoscopy. By J. HERBERT PARSONS, B.Sc., B.S., F.R.C.S., Curator, Royal London Ophthalmic Hospital. With 66 Illustrations, 8vo, 6s. 6d.

Ocular Therapeutics, according to the most recent Discoveries. By Dr. A. DARIER. Translated by SYDNEY STEPHENSON, M.B., C.M., Ophthalmic Surgeon to the Evelina Hospital and the North-Eastern Hospital for Children, etc. Roy. 8vo, 10s. 6d. net.

Glaucoma: Its Pathology and Treatment. By PRIESTLEY SMITH, Ophthalmic Surgeon to, and Clinical Lecturer on Ophthalmology at, the Queen's Hospital, Birmingham. 8vo, with 64 Engravings and 12 Zinco-photographs, 7s. 6d.

The Accessory Sinuses of the Nose; their Surgical Anatomy and the Diagnosis and Treatment of their Inflammatory Affections. By A. LOGAN TURNER, M.D.Edin., F.R.C.S.Edin., Surgeon for Diseases of the Ear and Throat, Deaconess Hospital, Edinburgh. With 40 Plates, 81 Figures. Imp. 8vo, 12s. net.

Diseases and Injuries of the Ear. By Sir WILLIAM B. DALBY, F.R.C.S., M.B., Consulting Aural Surgeon to St. George's Hospital. Fourth Edition. Crown 8vo, with 8 Coloured Plates and 38 Wood Engravings. 10s. 6d.

By the same Author.

Short Contributions to Aural Surgery, between 1875 and 1896. Third Edition. 8vo, with Engravings, 5s.

Diseases of the Ear, Including the Anatomy and Physiology of the Organ, together with the Treatment of the Affections of the Nose and Pharynx, which conduce to Aural Disease. By T. MARK HOVELL, Senior Aural Surgeon to the London Hospital, and Lecturer on Diseases of the Throat in the College. Second Edition. 8vo, with 128 Engravings, 21s.

A System of Dental Surgery. By Sir JOHN TOMES, F.R.S., and C. S. TOMES, M.A., F.R.S. Fourth Edition. Post 8vo, with 289 Engravings, 16s.

Dental Anatomy, Human and Comparative: A Manual. By CHARLES S. TOMES, M.A., F.R.S. Sixth Edition. Post 8vo, with 286 Engravings, 12s. 6d. net.

Dental Caries: an Investigation into its Cause and Prevention. By J. SIM WALLACE, M.D., D.Sc., L.D.S.R.C.S. 8vo, Second Edition, 5s.

Dental Medicine: A Manual of Dental Materia Medica and Therapeutics. By FERDINAND J. S. GORGAS, M.D., D.D.S., Professor of the Principles of Dental Science in the University of Maryland. Sixth Edition. 8vo, 18s.

Dental Materia Medica, Pharmacology and Therapeutics. By CHARLES W. GLASSINGTON, M.R.C.S., L.D.S. Edin.; Senior Dental Surgeon, Westminster Hospital; Dental Surgeon, National Dental Hospital; and Lecturer on Dental Materia Medica and Therapeutics to the College. Crown 8vo, 6s.

A Manual of Dental Metallurgy. By ERNEST A. SMITH, Assay Office, Sheffield. Second Edition. With 38 Illustrations. Crown 8vo, 6s. 6d.

A Practical Treatise on Mechanical Dentistry. By JOSEPH RICHARDSON, M.D., D.D.S. Seventh Edition revised and Edited by GEORGE W. WARREN, D.D.S. Roy. 8vo, with 690 Engravings, 22s.

A Manual of Nitrous Oxide Anæsthesia, for the use of Students and General Practitioners. By J. FREDERICK W. SILK, M.D. Lond., M.R.C.S., Anæsthetist to the Royal Free Hospital, Dental School of Guy's Hospital, and National Epileptic Hospital. 8vo, with 26 Engravings, 5s.

Skin Diseases of Children. By GEO. H. FOX, M.D., Clinical Professor of Diseases of the Skin, College of Physicians and Surgeons, New York. With 12 Photogravure and Chromographic Plates, and 60 Illustrations in the Text, Roy. 8vo, 12s. 6d

On the Causes and Continuance of Plague in Hongkong, with Suggestions as to Remedial Measures: A Report presented to the Secretary of State for the Colonies. By W. J. SIMPSON, M.D., F.R.C.P. With numerous Charts and Diagrams, Folio, 10s. net.

A Handbook on Leprosy. By S. P. IMPEY, M.D., M.C., late Chief and Medical Superintendent, Robben Island Leper and Lunatic Asylums, Cape Colony. With 38 Plates and Map, 8vo, 12s.

Diseases of the Skin (Introduction to the Study of). By P. H. PYE-SMITH, M.D., F.R.S., F.R.C.P., Physician to, and Lecturer on Medicine in, Guy's Hospital. Crown 8vo, with 26 Engravings. 7s. 6d.

A Manual of Diseases of the Skin, with an Analysis of 20,000 consecutive Cases and a Formulary. By DUNCAN L. BULKLEY, M.D., New York. Fourth Edition, Roy. 16mo, 6s. 6d.

Cancerous Affections of the Skin. (Epithelioma and Rodent Ulcer.) By George Thin, M.D. Post 8vo, with 8 Engravings, 5s.

By the same Author.

Pathology and Treatment of Ringworm. 8vo, with 21 Engravings, 5s.

The Operative Surgery of Malignant Disease. By Henry T. Butlin, F.R.C.S., Surgeon to St. Bartholomew's Hospital. Second Edition, with 12 Engravings. 8vo, 14s.

By the same Author.

Malignant Disease (Sarcoma and Carcinoma) of the Larynx. 8vo, with 5 Engravings, 5s.

Ringworm and some other Scalp Affections: their Cause and Cure. By Haydn Brown, L.R.C.P.Ed. 8vo, 5s.

The Diagnosis and Treatment of Syphilis. By Tom Robinson, M.D., Physician to the Western Skin Hospital. Second Edition, Crown 8vo, 3s. 6d.

By the same Author.

The Diagnosis and Treatment of Eczema. Second Edition, Crown 8vo, 3s. 6d.

Also.

Illustrations of Diseases of the Skin and Syphilis, with Remarks. Fasc. I. with 3 Plates. Imp. 4to, 5s. net.

Selected Papers on Stone, Prostate, and other Urinary Disorders. By Reginald Harrison, F.R.C.S., Surgeon to St. Peter's Hospital. 8vo, with 15 Illustrations. 5s.

Urine Examination made Easy; a Method of Examining Urine, with the Common Tests fully described. By Thomas Carruthers, M.A., M.B., Ch.B. 8vo, 1s. 6d. net.

Chemistry of Urine; A Practical Guide to the Analytical Examination of Diabetic, Albuminous, and Gouty Urine. By Alfred H. Allen, F.I.C., F.C.S. With Engravings, 8vo, 7s. 6d.

Clinical Chemistry of Urine (Outlines of the). By C. A. MacMunn, M.A., M.D. 8vo, with 64 Engravings and Plate of Spectra, 9s.

On the Development and Anatomy of the Prostate Gland, with and Account of its Injuries and Diseases and their Surgical Treatment. By W. G. Richardson, M.D., B.S., F.R.C.S., Assistant Surgeon at the Royal Infirmary, Newcastle-on-Tyne, Assistant Demonstrator of Operative Surgery at the University of Durham College of Medicine, Heath Scholarship Prize Essay. With 47 Plates. Imp. 8vo, 10s. 6d. net.

The Clinical Examination of Urine, with an Atlas of Urinary Deposits. By Lindley Scott, M.A., M.D. With 41 Original Plates (mostly in Colours). Crown 4to, 15s. net.

Electric Illumination of the Bladder and Urethra, as a Means of Diagnosis of Obscure Vesico-Urethral Diseases. By E. Hurry Fenwick, F.R.C.S., Surgeon to London Hospital and St. Peter's Hospital for Stone. Second Edition. 8vo, with 54 Engravings, 6s. 6d.

By the same Author.

Operative and Inoperative Tumours of the Urinary Bladder: a Clinical and Operative Study based on 500 Cases. With 39 Illustrations. 8vo, 5s.

Also.

Tumours of the Urinary Bladder. Fasc. I. Royal 8vo. 5s. net.

Also.

Ulceration of the Bladder, Simple, Tuberculous, and Malignant: A Clinical Study. Illustrated, 8vo, 5s. *Also.*

The Cardinal Symptoms of Urinary Diseases: their Diagnostic Significance and Treatment. 8vo, with 36 Illustrations. 8s. 6d.

Also.

Atlas of Electric Cystoscopy. Royal 8vo, with 34 Coloured Plates, embracing 83 Figures. 21s. net.

Also.

Obscure Diseases of the Urethra. With 63 Illustrations, 8vo, 6s. 6d.

Also.

Obscure Diseases of the Kidneys: the Value of Ureteric Meatoscopy in their Diagnosis and Treatment. Based on 400 Major Operations on the Kidney. With 6 Plates and 45 Figures in the Text. 8vo, 6s. 6d.

Urinary and Renal Derangements and Calculous Disorders. By Lionel S. Beale, F.R.C.P., F.R.S., Consulting Physician to King's College Hospital. 8vo, 5s.

BY SIR HENRY THOMPSON, Bart., F.R.C.S.

Diseases of the Urinary Organs. Clinical Lectures. Eighth Edition. 8vo, with 121 Engravings, 10s. 6d.

Practical Lithotomy and Lithotrity; or, An Inquiry into the Best Modes of Removing Stone from the Bladder. Third Edition. 8vo, with 87 Engravings, 10s.

The Preventive Treatment of Calculous Disease, and the Use of Solvent Remedies. Third Edition. Crown 8vo, 2s. 6d.

Tumours of the Bladder: Their Nature, Symptoms, and Surgical Treatment. 8vo, with numerous Illustrations, 5s.

Stricture of the Urethra, and Urinary Fistulæ: their Pathology and Treatment. Fourth Edition. 8vo, with 74 Engravings, 6s.

Diseases of the Rectum and Anus. By Sir ALFRED COOPER, F.R.C.S., Senior Surgeon to the St. Mark's Hospital for Fistula; and F. SWINFORD EDWARDS, F.R.C.S., Senior Assistant Surgeon to St. Mark's Hospital. Second Edition, with Illustrations. 8vo, 12s.

Cancer of the Rectum. Especially considered with regard to its Surgical Treatment. Jacksonian Prize Essay. By HARRISON CRIPPS, F.R.C.S., Surgeon to St. Bartholomew's Hospital. 8vo, with 13 Plates and several Wood Engravings, 6s.

Also.

The Passage of Air and Fæces from the Urethra. 8vo, 3s. 6d.

Syphilis. By Sir ALFRED COOPER, F.R.C.S., Consulting Surgeon to the West London and the Lock Hospitals. Second Edition. Edited by EDWARD COTTERELL, F.R.C.S., Surgeon (out-patients) to the London Lock Hospital. 8vo, with 24 Full-page Plates (12 coloured), 18s.

On Maternal Syphilis, including the presence and recognition of Syphilitic Pelvic Disease in Women. By JOHN A. SHAW-MACKENZIE, M.D. 8vo, with Coloured Plates, 10s. 6d.

A Medical Vocabulary: An Explanation of all Terms and Phrases used in the various Departments of Medical Science and Practice, their Derivation, Meaning, Application, and Pronunciation. By R. G. MAYNE, M.D., LL.D. Seventh Edition by W. W. WAGSTAFFE, B.A., F.R.C.S., and G. D. PARKER, M.B. Crown 8vo, 12s. 6d.

A Short Dictionary of Medical Terms. Being an Abridgment of Mayne's Vocabulary. 64mo, 2s. 6d.

Dunglison's Dictionary of Medical Science: Containing a full Explanation of its various Subjects and Terms, with their Pronunciation, Accentuation, and Derivation. Twenty-third Edition, much enlarged. By THOMAS L. STEDMAN, A.M., M.D. With 577 Illustrations, including 84 Page plates. Imp. 8vo, 34s. net.

Terminologia Medica Polyglotta: a Concise International Dictionary of Medical Terms (French, Latin, English, German, Italian, Spanish, and Russian). By THEODORE MAXWELL, M.D. Royal 8vo, 16s.

A German-English Dictionary of Medical Terms. By Sir FREDERICK TREVES, Bart., K.C.V.O., Surgeon to the London Hospital; and HUGO LANG, B.A. Crown 8vo, half-Persian calf, 12s.

A Handbook of Physics and Chemistry, adapted to the requirements of the first Examination of the Conjoint Board and for general use. By HERBERT E. CORBIN, B.Sc. Lond., and ARCHIBALD M. STEWART, B.Sc. Lond. Second Edition. With 153 Illustrations. Crown 8vo, 6s. 6d.

A Manual of Chemistry, Theoretical and Practical. By WILLIAM A. TILDEN, D.Sc., F.R.S., Professor of Chemistry in the Royal College of Science, London; Examiner in Chemistry to the Department of Science and Art. With 2 Plates and 143 Woodcuts, cr. 8vo, 10s.

The Elements of Chemistry. By M. M. PATTISON MUIR, M.A., Fellow and Prælector in Chemistry of Gonville and Caius College, Cambridge. With Illustrations, 8vo, 10s. 6d. net.

Chemistry, Inorganic and Organic. With Experiments. By CHARLES L. BLOXAM. Ninth Edition, by JOHN MILLAR THOMSON, F.R.S., Professor of Chemistry in King's College, London, and ARTHUR G. BLOXAM. 8vo, with 284 Illustrations, 18s. net.

By the same Author.

Laboratory Teaching; Or, Progressive Exercises in Practical Chemistry. Sixth Edition. By ARTHUR G. BLOXAM. Crown 8vo, with 80 Engravings, 6s. 6d.

Watts' Organic Chemistry. Edited by WILLIAM A. TILDEN, D.Sc., F.R.S., Professor of Chemistry, Royal College of Science. Second Edition. Crown 8vo, with Engravings, 10s.

Practical Chemistry

And Qualitative Analysis. By FRANK CLOWES, D.Sc. Lond., Emeritus Professor of Chemistry in the University College, Nottingham. Seventh Edition. Post 8vo, with 101 Engravings and Frontispiece, 8s. 6d.

Quantitative Analysis.

By FRANK CLOWES, D.Sc. Lond., Emeritus Professor of Chemistry in the University College, Nottingham, and J. BERNARD COLEMAN, Assoc. R. C. Sci. Dublin; Professor of Chemistry, South-West London Polytechnic. Sixth Edition. Post 8vo, with 125 Engravings, 10s.

By the same Authors.

Introduction to Quantitative Analysis.

Post 8vo, with 62 Engravings, 4s. 6d.

Also.

Elementary Practical Chemistry.

Fourth Edition. Post 8vo, 3s. 6d.

Part I., General Chemistry. With 75 Engravings, 2s. 6d. net.

Part II., Analytical Chemistry. With 20 Engravings, 2s. 6d. net.

Qualitative Analysis.

By R. FRESENIUS. Translated by CHARLES E. GROVES, F.R.S. Tenth Edition. 8vo, with Coloured Plate of Spectra and 46 Engravings, 15s.

By the same Author.

Quantitative Analysis.

Seventh Edition.

Vol. I., Translated by A. VACHER. 8vo, with 106 Engravings, 15s.

Vol. II., Translated by C. E. GROVES, F.R.S. 8vo, with 143 Engravings, 20s.

Inorganic Chemistry

(A System of). By Sir WILLIAM RAMSAY, K.C.B., Ph.D., F.R.S., Professor of Chemistry in University College, London. 8vo, with Engravings, 15s.

By the same Author.

Elementary Systematic Chemistry for the Use of Schools and Colleges.

With Engravings. Crown 8vo, 4s. 6d.; Interleaved, 5s. 6d.

Valentin's Practical Chemistry and Qualitative and Quantitative Analysis.

Edited by W. R. HODGKINSON, Ph.D., F.R.S.E., Professor of Chemistry and Physics in the Royal Military Academy, and Artillery College, Woolwich. Ninth Edition. 8vo, with Engravings and Map of Spectra, 9s. [The Tables separately, 2s. 6d.]

Practical Chemistry, Part I. Qualitative Exercises and Analytical Tables for Students.

By J. CAMPBELL BROWN, Professor of Chemistry in Victoria University and University College, Liverpool. Fourth Edition. 8vo, 2s. 6d.

The Analyst's Laboratory Companion:

a Collection of Tables and Data for Chemists and Students. By ALFRED E. JOHNSON, B.Sc.Lond., F.I.C. Third Edition, enlarged, crown 8vo, 6s. 6d. net.

Volumetric Analysis:

Or the Quantitative Estimation of Chemical Substances by Measure, applied to Liquids, Solids, and Gases. By FRANCIS SUTTON, F.C.S., F.I.C. Ninth Edition. 8vo, with 121 Engravings, 20s. net.

The Chemistry of the Terpenes.

By F. HEUSLER, Ph.D. Edited in English and enlarged by F. J. POND, M.A., Ph.D. 8vo, 17s. net.

Commercial Organic Analysis:

a Treatise on the Properties, Modes of Assaying, Proximate Analytical Examination, &c., of the various Organic Chemicals and Products employed in the Arts, Manufactures, Medicine, &c. By ALFRED H. ALLEN, F.I.C., F.C.S. 8vo.

Vol. I.—Introduction, Alcohols, Neutral Alcoholic Derivatives, &c., Ethers, Vegetable Acids, Starch and its Isomers, Sugars, &c. Third Edition. 18s.

Vol. II.—Part I. Fixed Oils and Fats, Glycerin, Nitro-Glycerin, Dynamites and Smokeless Powders, Wool-Fats, Dégras, etc. Third Edition. 14s.

Vol. II.—Part II. Hydrocarbons, Petroleum and Coal-Tar Products, Asphalt, Phenols and Creosotes, &c. Third Edition. 14s.

Vol. II.—Part III. Terpenes, Essential Oils, Resins and Camphors, Acid Derivatives of Phenols, Aromatic Acids. [*In preparation.*

Vol. III.—Part I. Tannins, Dyes and Colouring Matters, Inks. Third Edition. 18s.

Vol. III.—Part II. The Amines and Ammonium Bases, Hydrazines and Derivatives, Bases from Tar, The Antipyretics, &c., Vegetable Alkaloids, Tea, Coffee, Cocoa, Kola, Cocaine, Opium, &c. Second Edition. 18s.

Vol. III.—Part III. Vegetable Alkaloids, Non-Basic Vegetable Bitter Principles, Animal Bases, Animal Acids, Cyanogen and its Derivatives, &c. Second Edition. 16s.

Vol. IV.—The Proteïds and Albuminous Principles, Proteoïds or Albuminoïds. Second Edition. 18s.

Cooley's Cyclopædia of Practical Receipts, and Collateral Information in the Arts, Manufactures, Professions, and Trades: Including Medicine, Pharmacy, Hygiene and Domestic Economy. Seventh Edition, by W. NORTH, M.A. Camb., F.C.S. 2 Vols., Roy. 8vo, with 371 Engravings, 42s.

Chemical Technology: A Manual. By RUDOLF VON WAGNER. Translated and Edited by SIR WILLIAM CROOKES, F.R.S., from the Thirteenth Enlarged German Edition as remodelled by Dr. FERDINAND FISCHER. 8vo, with 596 Engravings, 32s.

Chemical Technology; Or, Chemistry in its Applications to Arts and Manufactures. Edited by CHARLES E. GROVES, F.R.S., WM. THORP, B.Sc., and W. J. DIBDIN, F.I.C.

Vol. I.—FUEL AND ITS APPLICATIONS. By E. J. MILLS, D.Sc., F.R.S., and F. J. ROWAN, C.E. Royal 8vo, with 606 Engravings, 30s.

Vol. II.—LIGHTING BY CANDLES AND OIL. By W. Y. DENT, J. MCARTHUR, L. FIELD and F. A. FIELD, BOVERTON REDWOOD, and D. A. LOUIS. Royal 8vo, with 358 Engravings and Map, 20s.

Vol. III. — GAS LIGHTING. By CHARLES HUNT. With 2 Plates and 292 Engravings. Royal 8vo, 18s.

Vol. IV.—ELECTRIC LIGHTING. By A. G. COOKE, M.A., A.M.I.E.E. PHOTOMETRY. By W. J. DIBDIN, F.I.C., F.C.S. Royal 8vo, with 10 Plates and 181 Engravings, 20s.

Technological Handbooks. EDITED BY JOHN GARDNER, F.I.C., F.C.S., and JAMES CAMERON, F.I.C.

BREWING, DISTILLING, AND WINE MANUFACTURE. Crown 8vo, with Engravings, 6s. 6d.

SOAPS AND CANDLES. Crown 8vo, with 54 Engravings, 7s.

The Microscope and its Revelations. By the late WILLIAM B. CARPENTER, C.B., M.D., LL.D., F.R.S. Eighth Edition, by the Rev. W. H. DALLINGER, LL.D., F.R.S. With 23 Plates and more than 800 Wood Engravings. 8vo, 28s. Half Calf, 32s. Or, in two vols, (sold separately), cloth, 14s. each.

Vol. I.—THE MICROSCOPE AND ITS ACCESSORIES.

Vol. II.—THE MICROSCOPE, ITS REVELATIONS.

Methods and Formulæ Used in the Preparation of Animal and Vegetable Tissues for Microscopical Examination, including the Staining of Bacteria. By PETER WYATT SQUIRE, F.L.S Crown 8vo, 3s. 6d.

The Quarterly Journal of Microscopical Science. Edited by E. RAY LANKESTER, M.A., LL.D., F.R.S.; with the co-operation of ADAM SEDGWICK, M.A., F.R.S., W. F. R. WELDON, M.A., F.R.S., and SYDNEY J. HICKSON, M.A., F.R.S. Each Number, 10s.

Chemistry an Exact Mechanical Philosophy. By FRED. G. EDWARDS. Illustrated. 8vo, 3s. 6d.

The Microtomist's Vade-Mecum: A Handbook of the Methods of Microscopic Anatomy. By ARTHUR BOLLES LEE, Assistant in the Russian Laboratory of Zoology at Villefranche-sur-Mer (Nice). Fifth Edition. 8vo, 15s.

Photo-Micrography (Guide to the Science of). By EDWARD C. BOUSFIELD, L.R.C.P. Lond. 8vo, with 34 Engravings and Frontispiece, 6s.

A Treatise on Physics. By ANDREW GRAY, LL.D., F.R.S., Professor of Natural Philosophy in the University of Glasgow. Vol. I. Dynamics and Properties of Matter. With 350 Illustrations. 8vo, 15s.

An Introduction to Physical Measurements, with Appendices on Absolute Electrical Measurements, &c. By Dr. F. KOHLRAUSCH, Professor at the University of Strassburg. Third English Edition, by T. H. WALLER, B.A., B.Sc., and H. R. PROCTER, F.I.C., F.C.S. 8vo, with 91 Illustrations, 12s. 6d.

Tuson's Veterinary Pharmacopœia, including the Outlines of Materia Medica and Therapeutics. Sixth Edition. Edited by JAMES BAYNE, F.C.S., late Professor of Chemistry and Toxicology in the Royal Veterinary College. Crown 8vo, 7s. 6d. net.

The Veterinarian's Pocket Remembrancer: being Concise Directions for the Treatment of Urgent or Rare Cases. By GEORGE ARMATAGE, M.R.C.V.S. Second Edition. Post 8vo, 3s.

Chauveau's Comparative Anatomy of the Domesticated Animals, revised and enlarged, with the Co-operation of S. ARLOING, Director of the Lyons Veterinary School. Edited by GEO. FLEMING, C.B., LL.D., F.R.C.V.S., late Principal Veterinary Surgeon of the British Army. Second English Edition. 8vo, with 585 Engravings, 31s. 6d.

Encyclopædia Medica, under the general editorship of CHALMERS WATSON, M.B., M.R.C.P.E. Complete in 14 Volumes, £13 12s. net.

INDEX TO J. & A. CHURCHILL'S LIST.

Allen's Chemistry of Urine, 11
——— Commercial Organic Analysis, 13
Andrewes' Disinfection and Sterilisation, 4
Armatage's Veterinary Pocket Remembrancer, 14
Ballantyne's Antenatal Pathology and Hygiene, 2
——— Essentials of Obstetrics, 3
Barnes (R.) on Obstetric Operations, 3
——— on Diseases of Women, 3
Beale (L. S.) on Liver, 7
——— Slight Ailments, 7
——— Urinary and Renal Derangements, 11
Beale (P. T. B.) on Elementary Biology, 2
Beasley's Book of Prescriptions, 5
——— Druggists' General Receipt Book, 5
——— Pharmaceutical Formulary, 5
Bell on Sterility, 4
Bentley and Trimen's Medicinal Plants, 5
Bentley's Systematic Botany, 5
Berkart's Bronchial Asthma, 6
Bernard on Stammering, 7
Berry's (Jas.) Thyroid Gland, 9
——— Surgical Diagnosis, 8
——— (R. J.) Regional Anatomy, 1
Bigg's Short Manual of Orthopædy, 9
Birch's Practical Physiology, 2
Bloxam's Chemistry, 12
——— Laboratory Teaching, 12
Bousfield's Photo-Micrography, 14
Bowlby's Injuries and Diseases of Nerves, 9
——— Surgical Pathology and Morbid Anatomy,
Brockbank on Gallstones, 8
Brown's (Haydn) Ringworm, 11
——— (Campbell) Practical Chemistry, 13
Bryant's Practice of Surgery, 8
Bulkley on Skin Diseases, 10
Butlin's Operative Surgery of Malignant Disease, 11
——— Malignant Disease of the Larynx, 11
Buzzard's Diseases of the Nervous System, 7
——— Peripheral Neuritis, 7
——— Simulation of Hysteria, 7
Cameron's Soaps and Candles, 14
Carpenter and Dallinger on the Microscope, 14
Carruthers on Urine Examination, 11
Cautley's Infant Feeding, 4
Charteris' Practice of Medicine, o
Chauveau's Comparative Anatomy, 14
Churchill's Face and Foot Deformities, 9
Clouston's Lectures on Mental Diseases, 3
Clowes and Coleman's Quantitative Analysis, 13
——— Elmntry Practical Chemistry, 13
Clowes' Practical Chemistry, 13
Coles on Blood, 6
——— Clinical Bacteriology, 3
Cooke's Electric Lighting, 14
Cooley's Cyclopædia of Practical Receipts, 14
Cooper on Syphilis, 12
Cooper and Edwards' Diseases of the Rectum, 12
Corbin and Stewart's Physics and Chemistry, 12
Cripps' (H.) Ovariotomy and Abdominal Surgery, 9
——— Cancer of the Rectum, 12
——— Air and Fæces in Urethra, 12
Cripps' (R. A.) Galenic Pharmacy, 4
Cuff's Lectures to Nurses, 4
Cullingworth's Short Manual for Monthly Nurses, 4
Dalby's Diseases and Injuries of the Ear, 10
——— Short Contributions, 10
Dana on Nervous Diseases, 7
Darier's Ocular Therapeutics, 10
Day on Headaches, 8
De Langenhagen on Entero-Colitis, 8
Dibdin's Photometry, 14
Duncan (A.), on Prevention of Disease in Tropics, 6
Dunglison's Dictionary of Medical Science, 12
Edwards' Chemistry, 14
Ellis's (T. S.) Human Foot, 9
Encyclopædia Medica, 14
Fagge's Principles and Practice of Medicine, 6
Fayrer's Climate and Fevers of India, 5
Fenwick (E. H.), Electric Illumination of Bladder, 11
——— Tumours of Urinary Bladder, 11
——— Ulceration of Bladder, 11
——— Symptoms of Urinary Diseases, 11
——— Atlas of Electric Cystoscopy, 11
——— Obscure Diseases of the Urethra, 11
Fenwick (E. H.), Obscure Diseases of the Kidneys, 11
Fenwick's (S.) Medical Diagnosis, 7
——— Outlines of Medical Treatment, 7
——— Ulcer of the Stomach and Duodenum, 7
——— Cancer of Stomach, 7
Fink's Operating for Cataract, 9
Fowler's Dictionary of Practical Medicine, 6
Fox (G. H.) on Skin Diseases of Children, 10
Fox (Wilson), Atlas of Pathological Anatomy of Lungs, 6
——— Treatise on Diseases of the Lungs, 6
Fraser's Operations on the Brain, 8
Fresenius Qualitative Analysis, 13
——— Quantitative Analysis, 13
Galabin's Diseases of Women, 4
——— Manual of Midwifery, 3
Gardner's Brewing, Distilling, and Wine Manuf., 14
Gerrard on Beri-beri, 6
Glassington's Dental Materia Medica, 10
Godlee's Atlas of Human Anatomy, 1
Goodhart's Diseases of Children, 4
Gorgas' Dental Medicine, 10
Gowers' Diagnosis of Diseases of the Brain, 7
——— Manual of Diseases of Nervous System, 7
——— Clinical Lectures, 7
——— Subjective Sensations and other Lectures, 7
——— Epilepsy, 7
——— Medical Ophthalmoscopy, 7
——— Syphilis and the Nervous System, 7
Granville on Gout, 8
Gray's Treatise on Physics, 14
Green's Manual of Botany, 5
——— Vegetable Physiology, 5
Greenish's Materia Medica, 4
——— Foods and Drugs, 4
——— and Collin's Vegetable Powders, 4
Groves, Thorp, and Dibdin's Chemical Technology, 14
Guy's Hospital Reports, 7
Habershon's Diseases of the Abdomen, 8
Hadley on Nursing, 4
Haig's Uric Acid, 6
——— Diet and Food, 2
Hamer's Manual of Hygiene, 2
Harrison's Urinary Organs, 11
Hartridge's Refraction of the Eye, 9
——— Ophthalmoscope, 9
Hawthorne's Galenical Preparations of B.P., 5
Heath's Injuries and Diseases of the Jaws 8
——— Minor Surgery and Bandaging, 8
——— Operative Surgery, 8
——— Practical Anatomy, 1
——— Clinical Lectures, 8
Hedley's Therapeutic Electricity, 5
Heusler on the Terpenes, 13
Hewlett's Bacteriology, 3
——— Serum Therapy, 3
Holden's Human Osteology, 1
——— Landmarks, 1
Horrocks' Bacteriological Examination of Water, 3
Hovell's Diseases of the Ear, 10
Hughes and Keith's Practical Anatomy, 1
Impey on Leprosy, 10
Ireland on Mental Affections of Children,
Jacobson's Operations of Surgery, 8
Jellett's Practice of Midwifery, 3
——— for Nurses, 3
——— Gynæcology, 4
Jessop's Ophthalmic Surgery and Medicine,
Johnson's (A. E.) Analyst's Companion, 13
Journal of Mental Science, 3
Kelynack's Pathologist's Handbook, 1
Knuthsen on Hiccough, 8
Kohlrausch's Physical Measurements, 14
Lane's Rheumatic Diseases, 8
Lawrie on Chloroform, 4
Lazarus-Barlow's General Pathology, 1
——— Pathological Anatomy, 1
Lee's Microtomist's Vade Mecum, 14
Leftwich's Syphonage, 6
Lewis and Balfour's Public Health, 2
Lewis (Bevan) on the Human Brain, 2
Lucas's Practical Pharmacy, 4
Luke's Anæsthetics, 4
MacMunn's Clinical Chemistry of Urine, 11

[*Continued on the next page.*

Macnamara's Diseases and Refraction of the Eye, 9
McNeill's Epidemics and Isolation Hospitals, 2
Malcolm's Physiology of Death, 9
Marsh's Clinical Essays and Lectures, 9
Marshall on Stretcher Drill, 2
Martin's Ambulance Lectures, 8
Maxwell's Terminologia Medica Polyglotta, 12
Maylard's Surgery of Alimentary Canal, 9
Mayne's Medical Vocabulary, 12
Microscopical Journal, 14
Mills and Rowan's Fuel and its Applications, 14
Milroy's Physiological Chemistry, 2
Moore's (N.) Pathological Anatomy of Diseases, 1
Moore's (Sir W. J.) Family Medicine for India, 6
——————— Manual of the Diseases of India, 6
Morris's Human Anatomy, 1
——— Anatomy of Joints, 1
Muir's Elements of Chemistry, 12
Murray's Hare-Lip and Cleft Palate, 8
Nettleship's Diseases of the Eye, 9
Notter's Hygiene, 2
Oliver's Abdominal Tumours, 4
———Diseases of Women, 4
Ophthalmic (Royal London) Hospital Reports, 9
Ophthalmological Society's Transactions, 9
Ormerod's Diseases of the Nervous System, 7
Parkes' (E.A.) Practical Hygiene, 2
Parkes' (L.C.) Elements of Health, 2
Parsons' Ophthalmic Optics, 10
Paton's (Noël) Physiology, 2
Pavy's Carbohydrates, 6
Pereira's Selecta è Prescriptis, 5
Pitt-Lewis's Insane and the Law, 3
Proctor's Practical Pharmacy, 5
Pye-Smith's Textbook of Medicine, 6
———— Diseases of the Skin, 10
Ramsay's Elementary Systematic Chemistry 13
————Inorganic Chemistry, 13
Richardson's Mechanical Dentistry, 10
Richardson on Prostate Gland, 11
Richmond's Antiseptic Principles for Nurses, 4
Roberts' (C. H.) Gynæcological Pathology, 3
Roberts' (D. Lloyd) Practice of Midwifery, 3
Robinson's (Tom) Eczema, 11
——————— Illustrations of Skin Diseases, 1
——————— Syphilis, 11
Ross's Diseases of the Nervous System, 7
St. Thomas's Hospital Reports, 7
Savill's Clinical Medicine, 6
Schofield's Force of Mind, 3
———— Unconscious Therapeutics, 3
Scott's Atlas of Urinary Deposits, 11
Shaw's Diseases of the Eye, 9
Shaw-Mackenzie on Maternal Syphilis, 12
Short Dictionary of Medical Terms, 12
Silk's Manual of Nitrous Oxide, 10
Simpson on Plague, 10
Smith's (Ernest A.) Dental Metallurgy, 10
Smith's (Eustace) Clinical Studies, 4
Smith's (Eustace) Disease in Children, 4
——————— Wasting Diseases of Infants and Children, 4
Smith's (F.) Bullet Wounds, 8
Smith's (F. J.) Medical Jurisprudence, 2
Smith's (J. Greig) Abdominal Surgery, 8
Smith's (Priestley) Glaucoma, 10
Solly's Medical Climatology, 8
Southall's Materia Medica, 5
Squire's (P.) Companion to the Pharmacopœia, 5
——————— Pocket Companion, 5
——————— London Hospitals Pharmacopœias, 5
——————— Methods and Formulæ, 14
Starling's Elements of Human Physiology, 2
Sternberg's Bacteriology, 6
Stevenson and Murphy's Hygiene, 2
Sutton's (F.) Volumetric Analysis, 13
Swain's Surgical Emergencies, 9
Swayne's Obstetric Aphorisms, 3
Taylor's (A. S.) Medical Jurisprudence, 2
Taylor's (F.) Practice of Medicine, 6
Thin's Cancerous Affections of the Skin, 11
———Pathology and Treatment of Ringworm, 11
Thompson's (Sir H.) Calculous Disease, 12
——————— Diseases of the Urinary Organs, 12
——————— Lithotomy and Lithotrity, 12
——————— Stricture of the Urethra, 12
——————— Tumours of the Bladder, 12
Thorne's Diseases of the Heart, 7
Thresh's Simple Method of Water Analysis, 2
———— Examination of Waters and Water Supplies, 2
Tilden's Manual of Chemistry, 12
Tirard's Medical Treatment, 7
Tobin's Surgery, 8
Tomes' (C. S.) Dental Anatomy, 10
Tomes' (J. and C. S.) Dental Surgery, 10
Treves and Lang's German-English Dictionary, 12
Tuke's Dictionary of Psychological Medicine, 3
Turner on Sinuses of the Nose, 10
Tuson's Veterinary Pharmacopœia, 14
Valentin and Hodgkinson's Practical Chemistry, 13
Wagner's Chemical Technology, 14
Wallace on Dental Caries, 10
Walsham and Spencer's Surgery, 8
Waring's Indian Bazaar Medicines, 5
———— Practical Therapeutics, 5
Watson's Diseases of Eye, 9
Watts' Organic Chemistry, 12
Wenckebach on Arhythmia of Heart, 6
West's (S.) How to Examine the Chest, 6
White's (Hale) Materia Medica, Pharmacy, &c., 4
Wilks' Diseases of the Nervous System, 7
Wilson's (Sir E.) Anatomists' Vade-Mecum, 1
Wilson's (G.) Handbook of Hygiene, 2
Wright's (H.), Malarial Fevers of Malaya, 5
——————— Beri-beri, 5
Wynter and Wethered's Practical Pathology, 1
Year-Book of Pharmacy, 5

N.B.—J. & A. Churchill's larger Catalogue of about 600 *works on Anatomy, Physiology, Hygiene, Midwifery, Materia Medica, Medicine, Surgery, Chemistry, Botany, &c. &c., with a complete Index to their Subjects, for easy reference will be forwarded post free on application.*

AMERICA.—*J. & A. Churchill being in constant communication with various publishing houses in America are able to conduct negotiations favourable to English Authors.*

LONDON: 7, *GREAT MARLBOROUGH STREET.*